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"ASSESSMENT OF KNOWLEDGE, ATTITUDE, AND PRACTICE ON DIABETIC-FRIENDLY PACKAGED FOODS AMONG TYPE 2 DIABETES PATIENTS IN HYDERABAD"

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ABSTRACT

BACKGROUND:

Diabetes mellitus is a chronic metabolic disorder that requires effective dietary management for optimal glycemic control. With the increasing availability of diabetic-friendly packaged foods, there is a growing need to understand diabetic patients' awareness, perceptions, and consumption practices related to these products. However, limited evidence exists regarding the knowledge, attitude, and practices of diabetic patients toward such foods.

METHODOLOGY:

Overview the quantitative design employed a validated KAP tool with sections on demographics, knowledge (nutrition labels, sweeteners), attitudes (perceptions, trust via Likert scales), and practices (consumption frequency, preferences via multiple-choice). Data underwent descriptive and inferential analysis (e.g., chi-square tests) using statistical software to identify associations with variables like age and education.

RESULTS:

Cross-sectional study among diabetic patients showed that most participants were middle-aged. Awareness of diabetic-friendly packaged foods and nutrition label reading was high, with carbohydrates considered the most important nutrient by many respondents. Despite good knowledge, misconceptions about sugar-free foods and doubts about product safety were noted. Attitude toward these foods was moderately positive, though concerns about artificial sweeteners and labelling credibility existed. Practices reflected cautious and limited use, with preference for home-cooked foods. Education, age, and duration of diabetes were significantly associated with knowledge and practices, while gender showed no significant association.

KEYWORDS: Diabetic friendly packaged food, low glycemic index, diabetes mellitus, Traditional food, KAP study

INTRODUCTION

Diabetes mellitus is a chronic metabolic disorder defined by increased blood glucose levels leading to defects like insulin secretion, insulin action or two of them. It is part of the quickest spreading public health obstacles worldwide, impacting millions of people over all age categories. The situation develops when the pancreas falls short to produce enough insulin, or when the body turns resistant to the insulin that is formed, heading to persistent hyperglycemia. If the blood glucose is not under control, our other vital organs may get damaged including the heart, kidney, eyes, nerves and blood vessels.

The global rate of diabetes has risen significantly over the last few decades due to quick urbanization, inactive lifestyle, unhealthy eating patterns, and increasing ratio of obesity. T2DM, which reports for more than ninety percentage of all cases, is mostly related with changeable risk factors like excess body weight, unhealthy diet, and inactive lifestyle. As compare type 1 diabetes is an autoimmune condition defined by the damage of pancreatic beta - cells and complete deficiency of insulin.

Diabetes not only enforces a major burden on individuals and families but also places significant pressure on the healthcare system due to its extended health problems and associated costs. Early identification, proper management, lifestyle transformation, and patient knowledge are necessary components in reducing disease progression and enhancing quality of life. As the prevalence proceeds to increase, understanding diabetes and its contributing factors remains a crucial priority in public health and clinical research. (Jerlyn Jones 2025)

Types of diabetes:

Diabetes mellitus contains a different group of metabolic disorders identified by chronic hyperglycemia developing from defects in insulin secretion, insulin action or mixture of the two. The assessment of diabetes has increased based on etiology, pathophysiology and clinical aspects. (Anoop Mishra et al 2022).

The main types include T1DM, T2DM, gestational diabetes.

T1DM:

T1DM is mainly an autoimmune condition in which body's defense system hits and collapse the in the pancreatic islets that produce insulin. This out comes in absolute insulin deficiency, making exogenous insulin necessary for survival

Characteristics.

- Usually happens in childhood or adolescence, but can occur at any age. Frequently related with genetic predisposition - particularly HLA- DR3, DR3, and DQ alleles.
- Presence of antibodies such as ICA (islet cell antibodies) GAD 65, 1A-2, and insulin autoantibodies.
- Fast initiation of symptoms like polyuria, polydipsia, weight loss, fatigue, and occasionally DKA

Pathophysiology:

- Autoimmune beta - cells damage is managed by T - lymphocytes.
- Environmental causes (viral infections, early cow's milk exposure, vitamin D deficiency) may activate the autoimmune process.
- Gradually decreases in endogenous insulin results in complete beta - cell loss.

Management:

- Permanent insulin therapy is compulsory.
- Continuous glucose monitoring and carbohydrates counting enhance the risk of DKA is high without proper insulin.

2. Type 2 diabetes mellitus

Type 2 diabetes makeup for 90 - 95% of all diabetes cases and is characterized by the presence of insulin obstruction. It develops steadily and is strongly affected by life style and environmental components. (Anoop Mishra et al 2022).

Characteristics:

- More usual in adults but progressively seen in adolescents and children.
- Intense family history and genetic exposure
- Related to obesity, central adiposity, inactive lifestyle, dyslipidemia, hypertension, and poor diet.
- Symptoms may be minimal or absent in the initial stages.

Pathophysiology:

- Insulin sensitivity in muscle, liver, and adipose tissue leads to damaged glucose intake.
- Beta-cells at first balance by expanding insulin secretion.
- Gradually, beta-cells impairment progresses, resulting in hyperglycemia.
- Chronic swelling, lipotoxicity, glucotoxicity and oxygen mediated stress speed up beta-cells decreases.

Management:

- **Lifestyle adaptation:** diet physical exercise, management of weight.
- Oral antidiabetic agents (metformin, sulfonylureas)
- Injectable therapies (insulin, GLP-1 receptor, agonists)
- Long – term difficulties include cardiovascular disease, neuropathy, nephropathy, retinopathy.

3.Gestational diabetes mellitus:

GDM indicates glucose sensitivity first identified during pregnancy. It impacts 7-14% of pregnancies across the world and raises risk to both mother and fetus

Characteristics:

- Generally diagnosed in the 2nd or 3rd gestational period.
- Risk factors: diabetes in family history, obesity, progressed maternal age, previous GDM, PCOS.
- Usually it improves after birth, but relapse is usual in future pregnancies.

Pathophysiology:

- Pregnancy hormones (human placenta, lactogen) elevate insulin sensitivity.
- Pancreatic beta-cells collapse to produce enough insulin to manage this sensitivity.
- Hyperglycemia effects the stability between insulin secretion and insulin sensitivity.

Consequences:

- **Maternal:** operative delivery, elevated risk of type 2 diabetes, pre-eclampsia.
- **Fetal:** macrosomia, neonatal hypoglycemia, raised lifetime risk of obesity and diabetes.

Management:

- Medical nutrition therapy, fitness activity, and blood sugar monitoring.
- Insulin is selected when glycemic goals are not obtained, some oral factors may be used depending on guidelines.

4.Secondary diabetes

Secondary diabetes arises due to diagnosable causes that affect normal insulin production.

Common causes:

- **Pancreatic dysfunction:** chronic pancreatitis, cystic fibrosis, pancreatic cancer, pancreatectomy.
- Endocrine dysfunction: hyperthyroidism, Cushing’s syndrome, immunosuppressants.

Medication: corticosteroids, antipsychotic, thiazide diuretics injection.

Genetic syndrome: down syndrome, turner syndrome.

Pathophysiology:

- Damage or surgical excision of pancreatic tissue decreases insulin production.
- Hormonal excess (cortisol, hormones of growth) irritates insulin action.
- Drugs may cause insulin sensitivity or damage beta- cell function

Management:

- Resolving the causal causes whole managing hyperglycemia.
- May indicate insulin or oral antidiabetic therapies based on severity.

5. Monogenic diabetes:

Monogenic diabetes outcomes from mutations in a single gene impairing beta-cell function. It is associated with MODY and neonatal diabetes, which are frequently misdiagnosed as type 1 or type 2 diabetes mellitus.

a. MODY:

Maturity onset diabetes of the young is a mixed group of autosomal dominant disorders typically appearing in adolescence or early adulthood.

Characteristics:

- Strong family history, normally present in three stepwise generations mild to moderate hyperglycemia.
- Absence of autoantibodies and no insulin sensitivity.
- Sixteen genes diagnosed (GCK mutations, HNF4A,)

Management:

- **Treatment differs by subtype GCK-MODY:** normally does not indicate medication
- **HNF1A/HNF4A-MODY:** reacts well to sulfonylureas.
- Genetic testing is mandatory for diagnosis.

b. Neonatal diabetes mellitus:

A rare form diagnosed within the initial six months of life.

Types:

- **Transient neonatal diabetes:** it will be healed but can also recur in adolescence.
- **Permanent neonatal diabetes:** It needs lifelong care.

Causes:

- Mutations in gene balancing insulin secretion [KCNJ11, ABCC8]

Management:

- Some patterns respond to sulfonylureas therapy rather than insulin, based on the mutation.

6.Prediabetes:

Even though it is not classified as a type of diabetes, it is an important stage of dysglycemia, signifying High risk for arising type 2 diabetes.

Clinical categories:

- **Impaired fasting glucose (IFG)**
- **Impaired glucose tolerance (IGT)**
- **Increased HbA1c (5.7-6.4%)**

Significance:

- Strong sign of future type 2 diabetes.
- Related with initial vascular variations.
- Lifestyle interventions can reduce progression by up to 58%>

Diagnosis of Diabetes:

The diagnosis of diabetes mellitus depends on measuring blood glucose levels and monitoring biochemical variables that reveal long term glycemic status. A diagnosis usually requires meeting any one of the terms on two separate occasions, unless usual issues of hyperglycemia are present. (Waqas Sami et al 2017)

1.Fasting plasma glucose (FPG)

Test measures blood glucose after at least 8 hours of fasting.

Diagnostic value:

- ≥126mg/dL(11.1mmol/L)- diabetes.
- 100-125mg/dL impaired glucose tolerance (prediabetes)

2.Random plasma glucose:

It can be measured at any time of the day without referring to meals.

Diagnostic value:

- ≥ 200mg/dL (11.1mmo/L) with common symptoms (polyuria, polydipsia, weight loss)- diabetes

3.Oral glucose tolerance test:

Plasma glucose levels measured 2 hours after consuming 75 grams of glucose.

Diagnostic value:

- ≥ 200 mg/dL(11.1mmol/L)- diabetes
- 149-199 mg/dL- impaired glucose tolerance (prediabetes)

4.HbA1c level test:

Indicates usual blood glucose over the earlier 2-3 months

Diagnostic value:

- ≥6.5%- Diabetes
- 5.7 – 6.4 % - pre-diabetes clinical parameters used in health assessment and patient monitoring.

These measurements give clinical support to diagnose and help evaluate clinical problems.

1.Fasting blood glucose (FBG):

- Demonstrates hepatic glucose generation and fasting glucose.

2.Postprandial blood glucose (PPBG):

- Assessed 2 hours after a meal
- Normal ≤ 140 mg/dL, diabetes: ≥ 200 mg/dL

3.HbA1c:

- Chronic to regulate, not impacted acute variations

4.C-Peptide levels

- Differentiate between type 1 and type 2 diabetes.

5.Autoantibody test: (for type 1 diabetes)

- GAD65 antibodies
- IA-2 antibodies
- ZnT8 antibodies.

6.Lipid profile:

- Dyslipidemia is frequently occurring: high triglycerides, high LDL, low HDL.

7.Kidney function tests:

- UACR (urine albumin – creatinine ratio)
- Serum cream, eGFR.

8.LFT (Liver Function tests)

- To identify NAFLD, generally related with type 2 diabetes mellitus. (Sabrina Alves Fernandez et al 2024).

Complications of Diabetes

Diabetes mellitus, particularly when inadequately controlled, leads to a wide spectrum of acute and chronic complications due to prolonged hyperglycemia and metabolic disturbances. These complications arise from structural and functional damage to blood vessels, nerves, and vital organs. They significantly impact quality of life, increase healthcare burden, and may lead to disability or premature mortality. (Almond Shalit 2024)

1. Acute Complications

These occur suddenly and require immediate medical attention.

a. Hypoglycemia

it is Caused by excess insulin, skipped meals, or intense physical activity.

Symptoms include sweating, shakiness, confusion, irritability, and in severe cases seizures or coma.

b. Diabetic Ketoacidosis (DKA)

Mostly seen in Type 1 diabetes; triggered by insulin deficiency.

Characterized by high blood glucose, ketone production, dehydration, rapid breathing, and fruity odor breath. Can be life-threatening if untreated.

c. Hyperosmolar Hyperglycemic State (HHS)

More common in Type 2 diabetes

Extremely high blood glucose with severe dehydration but minimal ketones.

Can lead to coma and high mortality if not managed promptly.

2. Chronic Complications

These develop gradually over years due to persistent hyperglycemia, oxidative stress, and vascular injury. They are divided into microvascular and macrovascular complications.

Microvascular Complications

a. Diabetic Retinopathy

Damage to retinal blood vessels, leading to microaneurysms, hemorrhages, and vision loss.

Can progress to blindness if not screened regularly.

b. Diabetic Nephropathy

Kidney damage due to glomerular injury, causing proteinuria, declining renal function, and potentially end-stage renal disease (ESRD).

One of the main factors of chronic kidney disease across the world.

c. Diabetic Neuropathy

Nerve damage affecting sensory, motor, and autonomic nerves.

Leads to numbness, burning pain, loss of sensation, digestive issues, sexual dysfunction, and foot ulcers.

Macrovascular Complications

a. cardiovascular disease

Diabetes accelerates atherosclerosis, increasing risk of heart attacks, angina, and heart failure.

Major cause of mortality among diabetics.

b. Cerebrovascular Disease

Higher likelihood of stroke and transient ischemic attacks due to compromised cerebral circulation.

c. Peripheral Arterial Disease (PAD)

Reduced blood flow to limbs, especially legs, causing claudication, poor wound healing, and risk of gangrene. (Sabrina Alves Fernandez et al 2024).

Other Important Complications

a. Diabetic Foot

Combination of neuropathy, poor circulation, and infection.

Leads to ulcers, gangrene, and risk of amputation.

b. Infections

Increased susceptibility to skin, urinary tract, fungal, and respiratory infections due to weakened immune response.

c. Dental Problems

Periodontitis and gum infections occur more frequently in poorly controlled diabetes.

d. Sexual Dysfunction

Erectile dysfunction in men and decreased libido or vaginal dryness in women due to nerve and vascular damage.

The complications of diabetes are multifactorial and largely preventable through early diagnosis, lifestyle modification, proper glycemic control, routine screening, and patient education. Awareness about packaged foods, carbohydrate content, and nutrition labeling is essential for preventing long-term complications, especially in Type 2 diabetic patients.

NUTRITIONAL CATEGORIES OF DIABETIC-FRIENDLY FOODS

In Knowledge, Attitude, and Practice (KAP) studies on T2DM self-management, diabetes-friendly foods—characterized by low GI, high fiber, and balanced macronutrients—empower informed decision-making to optimize glycemic regulation and metabolic stability(Sabrina Alves Fernandez et al 2024).(Waqas Sami et al 2017) .Enhanced knowledge of their attributes fosters positive attitudes toward sustainable choices like whole grains and legumes, translating into practices that diminish postprandial hyperglycemia and improve long-term outcomes(Anoop Mishra et al 2022) This framework underscores the pivotal role of nutritional literacy in bridging evidence-based dietary recommendations with patient adherence.(Almond Shalit 2024)

Low-GI Carbohydrates

Whole grains like quinoa, barley, and oats represent key low-glycemic index (GI) carbohydrates for diabetes management, releasing glucose slowly to prevent blood sugar spikes. (Annia Soronio et al 2025). Legumes such as lentils, chickpeas, and beans provide complex carbs with high fiber, supporting sustained energy and improved insulin sensitivity. (Sabrina Alves Fernandez et al 2024). These foods minimize postprandial hyperglycemia compared to refined grains. (Almond Shalit 2024).

High-Fiber Vegetables and Fruits

Non-starchy vegetables including broccoli, spinach, kale, and peppers deliver fiber, vitamins, and antioxidants with minimal glycemic impact, aiding glycemic control.(Jerlyn Jones 2025) .Low-GI fruits like berries, apples, pears, and citrus fruits offer phytonutrients and fiber that slow glucose absorption and enhance satiety.(Annia Soronio et al 2025).These choices reduce oxidative stress and support metabolic health in type 2 diabetes.(Anoop Mishra et al 2022).

Lean Proteins and Healthy Fats

Lean proteins from sources like fish, poultry, eggs, tofu, and Greek yogurt stabilize blood sugar by slowing gastric emptying and promoting muscle repair. (Waqas Sami et al 2017). Healthy fats in avocados, nuts, seeds, and olive oil improve insulin efficiency and lipid profiles without raising glucose levels. (Annia Soronio 2025). These components foster satiety and reduce inflammation. (Sabrina Alves Fernandez et al 2024).

Dairy and Plant-Based Alternatives

Low-fat dairy options such as unsweetened yogurt and milk supply calcium and protein while limiting added sugars for better glycemic regulation. (Jerlyn Jones 2025). Unsweetened plant-based alternatives like almond or soy milk provide similar benefits for those avoiding dairy, maintaining metabolic stability. (Waqas Sami et al 2017).

TRADITIONAL FOODS IN DIABETES MANAGEMENT

Indian Traditional Grains and Millets Traditional

Indian grains like barley, pearl millet (bajra), finger millet (ragi), and jowar provides low glycemic index (GI) readings, supporting balanced blood glucose levels in diabetes management. (Meena Mohan et al 2021) Barley, mentioned in traditional scripts like the Rigveda, contains β-glucan that decreases postprandial blood glucose and cholesterol when utilized in flatbreads or porridges. (Meena Mohan et al 2021) Millets serve as gluten-free substitutes for rice and wheat in dishes like rotis, idlis, and soups, sustaining glycemic control (Meena Mohan et al 2021)

BITTER VEGETABLES AND HERBS

Bitter Vegetables and Herbs Bitter gourd (karela), fenugreek leaves (methi), and okra (bhindi) form basic essentials in Ayurvedic diets for managing Kapha dosha and improving insulin secretion. (Kajal hansda et al 2021). These vegetables decrease blood sugar through fiber content and prebiotic properties, with raw banana and tender jackfruit flours aiding smooth glycemic management. Fenugreek and turmeric spices further improve insulin sensitivity and reduce swelling. (Kajal hansda et al 2021).

LEGUMES AND PULSES

Legumes and Pulses Moong dal, chana dal, urad dal, and whole moong dal provide high fiber and protein, slowing glucose absorption in traditional preparations like khichdi, cheela, and curries. (Meena Mohan et al 2025) These pulses, integral to Indian cuisine, support satiety and metabolic health without spiking blood sugar. Black chickpeas (chana) in sandal-style dishes exemplify low-GI options.

LOW-GI FRUITS AND STARCHY ALTERNATIVES

Low-GI Fruits and Starchy Alternatives Guava, apples, pears, and papaya offer antioxidants and fiber in moderation, aligning with traditional low-GI fruit choices. (Anju Virmani et al 2025) Sweet potatoes and raw banana serve as starchy vegetable substitutes with moderate GI, factoring into insulin dosing for better control. Berries and amla provide additional phytonutrients in Ayurvedic contexts.

DIARY, NUTS, AND FERMENTED FOODS

Dairy, Nuts, and Fermented Foods Low-fat paneer, Greek yogurt, and fermented items like yogurt enhance gut health and protein intake while stabilizing glucose. (Meena Mohan et al 2025) Nuts such as almonds and walnuts, along with seeds like flaxseeds, deliver healthy fats traditional in Indian diets. These support heart health and insulin efficiency in holistic diabetes management.

DIABETIC FRIENDLY PACKAGED FOODS IN DIABETES MANAGEMENT

Sugar-free biscuits, low-GI snack bars, multigrain crackers, and high-fiber cereals offer convenient, guideline-aligned options that align with therapeutic diets. (Dr. Ami Shah 2025). These products expand access to diabetes-friendly nutrition, supporting adherence in daily practice. (Annia soronio 2025).

Crackers and Crunchy Snacks

Simple Mills Almond Flour Crackers and Sprouted Seed Crackers provide low-carb, nut- or seed-based alternatives to traditional crackers, supporting stable blood sugar with high fiber. (Mary Ellen Phipps 2025). Wasa Multigrain Crackers offer larger portions ideal for toppings, while Catalina Crunch Keto Friendly

Crunch Mix serves as a Chex Mix substitute with controlled carbs. These minimize glycemic impact for convenient snacking.

Cookies and Sweet Treats

Simple Mills Crunchy and Soft Baked Cookies mimic classic chocolate chip varieties using almond flour for lower carbs and blood sugar friendliness. (Mary Ellen Phipps 2025). Rip Van Romeos crème cookies deliver 3g fiber per serving with only 4g sugar, and Lily's Sweets Chocolate Peanut Butter Cups and Dark Chocolate Covered Caramels use no-added-sugar formulas. JoJo's Chocolate Bark and Hail Merry Dark Chocolate Bites add protein for sustained energy (Mary Ellen Phipps 2025).

Bars and Protein Snacks

YES Bars, particularly Macadamia Chocolate flavor, combine 3g fiber, 5g protein, and minimal low-GI coconut nectar sweetener to prevent energy crashes. Magic Spoon Treats provide rice Krispie-style options with 11g protein and 8g fiber in flavors like marshmallow or chocolate peanut butter. These support satiety without spikes. (Mary Ellen Phipps 2025)

Nuts, Mixes, and Savory Options

Orchard Valley Harvest Choc Nut Mix offers a low-sugar trail mix alternative with 3g fiber per bag and 11g total carbs. Roasted chickpeas and GudSwap by BeatO Little Millet Noodles deliver high-protein, no-Maida, sugar-free choices rich in magnesium for diabetes management. (Krishna herbal 2024) These align with low-GI guidelines for daily use. (Mary Ellen Phipps 2025)

Sugar-Free Sweets and Elements

Sugar-free sweets using stevia, aspartame, or sucralose supports to manage and enjoyment with slight blood sugar spike, fewer calories, and dental benefits, though balance avoid over-dependence. (Dr. Rohan J Harsoda al2024). Always check labels for total carbs, fiber, and hidden sugars to validate consistency with individual glycemic needs.

Diabetic friendly packaged foods Uses in Diabetes Management

Diabetic-friendly packaged foods, such as low-GI crackers (e.g., Simple Mills Almond Flour), sugar-free chocolate (Lily's Sweets), high-fiber cereal bars, and nut-based mixes, provide portable, portion-controlled alternatives to high-carb snacks, enabling blood glucose stability during work, travel, or irregular schedules.(Andrew Reynolds et al 2024).These products incorporate fiber (≥3g/serving), protein, and sugar alcohols or stevia to slow digestion, enhance satiety, and reduce postprandial spikes, aligning with ADA recommendations for 45-60g carbs per meal.(Mary Ellen Phipps 2025). They facilitate adherence to plate methods or carb counting by offering predictable glycemic responses, particularly beneficial for type 2 diabetes patients managing HbA1c <7% through consistent nutrition. (Alison B. Evert et all 2019).

Limitations of consuming packaged food

While convenient, these foods often harbor hidden sodium (>200mg/serving), artificial additives, or palm oil that elevate cardiovascular risks despite low sugar claims, necessitating vigilant label reading. (Andrew Reynolds et al 2024). They deliver inferior micronutrient density compared to fresh produce, potentially falling short of fiber targets (14g/1,000 kcal) and displacing whole foods essential for gut health and antioxidants. Ultra-processed formulations may alter gut microbiota over time, contributing to insulin resistance despite individual low-GI ratings. (Andrew Reynolds et al 2024).

Miss guided of packaged food

Consuming “sugar-free” items excessively (e.g., multiple bars daily) accumulates calories from fats and sugar alcohols, promoting weight gain and laxative effects without glycemic benefit. (Mary Ellen Phipps 2025) Pairing them with refined carbs or overlooking total daily carbs negates low-GI advantages, leading to unpredictable glucose excursions and poor self-monitoring habits. (Andrew Reynolds et al 2024). Replacing whole meals with snacks fosters nutritional imbalances, undermining long-term metabolic control and increasing reliance on processed options.

Guidelines for Safe and Effective Use of packaged food

Select products with GI <55, ≥3g fiber, <5g net carbs, no trans fats, and minimal sodium (<140mg/serving); prioritize nut/seed-based over grain-heavy for better insulin response. (Andrew Reynolds et al 2024) Limit to 1-2 servings daily (15-30g carbs) as between-meal bridges, paired with non-starchy veggies or protein; test blood glucose 1-2 hours post-consumption to personalize. Integrate into cultural diets (e.g., millet-based Indian snacks) under dietitian guidance, favoring whole foods ≥80% of intake; avoid if kidney issues due to phosphorus/potassium content.

Core Principles of Dietary Management

Dietary management for diabetes mellitus prioritizes individualized nutrition therapy to achieve glycemic targets (HbA1c <7%), prevent complications, and promote weight control through balanced macronutrient distribution.(Katsumi lizuka et al 2023)Key strategies include selecting low-glycemic index (GI) foods (GI <55) to minimize postprandial glucose excursions, aiming for 30-50 g fiber daily from whole sources, and limiting saturated fats to <9% of total energy while emphasizing unsaturated fats. Evidence supports flexible patterns like Mediterranean, low-carbohydrate (<130 g/day), or plant-based vegetarian diets, with no fixed carbohydrate/protein/fat ratios; instead, adjust based on metabolic response, activity level, and cultural preferences, incorporating ≥14 g fiber per 1,000 kcal consumed. Hydration with water over sugar-sweetened beverages further supports metabolic stability. (Andrew Reynolds et al 2024)

Recommended Food Groups and Their Benefits

Non-starchy vegetables (broccoli, spinach, peppers) form the bulk of plates, providing volume, fiber, and micronutrients with negligible carbs to enhance satiety and glycemic control. Whole grains (oats, barley, quinoa) and legumes (lentils, chickpeas, beans) deliver complex carbohydrates and soluble fiber like β-glucans, slowing digestion and improving insulin sensitivity. (Katsumi lizuka et al 2023) Fruits in moderation (berries, apples, citrus) offer antioxidants and pectin for gradual glucose release. Lean proteins such as fatty fish (salmon for omega-3s), skinless poultry, eggs, tofu, and low-fat dairy or unsweetened plant milks (almond, soy) preserve muscle mass and delay gastric emptying. Healthy fats from avocados, nuts (almonds, walnuts), seeds, and olive oil reduce inflammation and LDL cholesterol while promoting fullness.

Practical Meal Planning Methods

The plate method allocates half the plate to non-starchy vegetables, one-quarter to lean proteins, and one-quarter to whole grains or starchy vegetables for balanced, intuitive portions. Carbohydrate counting (45-60 g/meal) or exchange systems enable precise insulin dosing, while glycemic load (GL) assessment refines choices. (Andrew Reynolds et al 2023) Structured patterns like DASH (rich in fruits/vegetables), Nordic (whole grains/fish), or vegetarian diets yield superior HbA1c reductions (0.3-2%) when sustained. Integrate regular monitoring, physical activity (150 min/week), and multidisciplinary support for long-term adherence and outcomes. (Katsumi lizuka et al 2023)

FOODS TO EAT

Foods to Eat Non-starchy vegetables like broccoli, spinach, kale, cauliflower, bell peppers, and zucchini provide high fiber and low carbs to regulate blood sugar and promote satiety. (Alexandra benisek et al 2024). Whole grains such as quinoa, oats, barley, brown rice, and bean-based pasta offer sustained energy through fiber and nutrients, minimizing glucose spikes. Fatty fish (salmon, sardines, mackerel), lean proteins (chicken breast, tofu, eggs, low-fat Greek yogurt), nuts/seeds (almonds, walnuts, chia, flax), and fruits (berries, apples, citrus) deliver omega-3s, protein, healthy fats, and antioxidants for insulin sensitivity and heart health.(Jerlyn Jones et al 2025).Legumes including beans, lentils, chickpeas, and peas supply plant-based protein and fiber for glycemic control.

FOODS TO AVOID

Foods to Avoid or Limit Refined carbohydrates like white bread, white rice, white pasta, and potatoes digest quickly, causing sharp blood sugar rises. (Alexandra benisek et al 2025) Sugary beverages (soda, fruit juice, sweetened tea), pastries, cookies, candy, and granola bars deliver empty calories and added sugars that provoke hyperglycemia. Fatty cuts of meat (ribeye steak, pork chops, processed meats), full-fat dairy (regular cheese, whole milk), fried foods (French fries, onion rings), and dried fruits (raisins, apricots) increase saturated fats, calories, and glycemic load, heightening cardiovascular risks. Ultra-processed snacks like potato chips and cheese crackers lack fiber and exacerbate insulin resistance.

CORE RATIONALE

Studying knowledge, attitude, and practice (KAP) on diabetic-friendly packaged foods among type 2 diabetes patients identifies gaps in understanding nutritional labels, hidden sugars, and glycemic index, enabling targeted education to improve self-management.(Dan yang et al 2021).Addressing Dietary Gaps Type 2 diabetes patients often show poor dietary knowledge and practice, with only moderate attitudes toward recommended diets, leading to suboptimal glycemic control like higher HbA1c levels.(Asif khan et al 2021). Packaged foods, increasingly consumed, present risks from misleading claims, necessitating KAP assessment to promote label-reading and selection of low-sodium, high-fiber options.(Arun Kumar et al 2022).Informing Interventions KAP studies reveal correlations between patient and family member behaviors, supporting family-inclusive programs to enhance adherence and reduce complications.(Dan yang et al 2021).They guide policy for health education, as better knowledge links to improved practices, particularly in high-prevalence regions.(Asif khan et al 2021).Public Health Benefits Such research bridges knowledge-practice gaps amid rising processed food use, fostering cost-effective care through workshops on diabetic-friendly criteria and reducing diabetes burden.(Fatemeh Mousavi et al 2021)

AIM OF THE STUDY:

To evaluate the knowledge, attitude and practice related to diabetic friendly packaged foods among type 2 diabetes patients in Hyderabad, with the intention to know their perceptions, understanding, and genuine practice for more effective dietary management.

OBJECTIVES OF THE STUDY:

- To assess the knowledge of Type 2 diabetic patients in Hyderabad regarding diabetic-friendly packaged foods.
- To evaluate their attitudes and perceptions towards these products.
- To examine the practices and frequency of use of diabetic-friendly packaged foods among the patients.
- To compare the knowledge, attitude, practice (KAP), and awareness levels across different subgroups of patients based on age, gender, educational status, and duration of diabetes.

REVIEW OF LITERATURE

Daivikkumar Hemal Kumar Doshi et al (2025) evaluated awareness, understanding of nutrition labels and processed food consumption among 361 adolescents from 4 schools of Vadodara Gujarat. Students scored an average of 56% meaning 44% had insufficient nutrition labels literacy and interpretation skills. Adolescents had difficulty with interpreting best – before dates, food additives, nutrient content, ISI mark, and FSSAI symbols. Eating patterns of packaged food was high 78% ate biscuits,60% ate chips,43% ate noodles, at least once a week. Limited understanding of labels along with common packaged food ingestion indicates adverse consumption. The study reveals that immediate need for school-based education programs to improve nutrition labels knowledge and healthier food choices.[1]

Tanner Dimeric et al (2025) inspected how food knowledge effect eating behavior and metabolic results in 240 type 2 diabetes patients. Higher food knowledge was connected to healthier consuming behavior and low fasting blood glucose. Lack of consuming patterns were associated with higher HbA1c levels. Food knowledge eating behavior and fasting glucose together explained 33.2% of HbA1c changes. The study highlights that improving food knowledge can help enhance glycemic control and lipid profile in diabetic patients.[2]

Brandon J Stroud (2025) evaluated how a 20-week meal planning skills program helped people with type 2 diabetes. The activity involved group classes, cooking and food skills training, produce support and phone follow up. Respondents become more confident in choosing and preparing foods, their diet was improved especially fruits vegetables and whole grains. Stress levels reduced and better food skills and self-management helped reduce stress. Blood pressure also became better, showing overall better health.[3]

Singh et al (2024) studied a patient population in Bihar, India, and found that 56.9% had "good" knowledge and positive attitudes toward DR, but only 43.1% demonstrated good practice (e.g., regular eye screening). The authors reported a statistically significant association between knowledge and practice (χ^2, $p < .0001$).[4]

Juanli Huang et al. (2024) conducted KAP on dietary nutrition in older adults with T2DM and Tuberculosis. Found low knowledge scores (6.84/24) and moderate attitude and Practice score Positive correlation between knowledge, attitude, and practice. Emphasized the need for targeted dietary education for better Outcomes.[5]

Faisal Mohammed Alharbi et al (2024) observed that how nutrition knowledge impacts what people with type 2 diabetes eat. 125 adults with type 2 diabetes mellitus were evaluated using the dietary knowledge questionnaire. Participants recorded their food intake for four days, which was assessed using verified software people with higher nutrition knowledge ate more energy relative to their needs. They also ate more fruits vegetables and had a lower dietary glycemic index. Those with low nutrition knowledge undervalued food intake more often and consumed less sugar and non- milk sugar. The study determines that better nutrition knowledge improves dietary habits and may help with diabetes management.[6]

Abdullah M Alshahrani (2023) conducted a food labeling knowledge and associated reading barriers among patients with diabetes, Both the types of patients have poor knowledge in reading food labels, they found difficulties in it. They gave educational discussion by primary medical care, specialized physician DM educator to educate them about food labels which will be helpful to them for choosing food, appropriately.[7]

L Gayoso et al (2023) inspected if online cooking classes could help people with Type 2 Diabetes eat healthier and boost their health. One group got cooking instructions and the other group only got written diet data After 3 months, the cooking group showed better results in inflammation and healthy cholesterol, while the written-info group had higher blood sugar and LDL. The cooking group also lost weight, lowered their BMI, and reduced waist size — even after 1 year. They also initiated using healthier cooking techniques like boiling and steaming and ate more raw vegetables. In general, cooking techniques are based on the Mediterranean Diet may be beneficial but bigger studies are needed to validate the impact on blood sugar.[8]

Ibrahim et al. (2023) evaluated the impact of CC on diabetes management. They report that CC provides better glycemic control and flexibility, and may hold promise for T2DM management (especially when combined with low-glycemic index diets). They also note that CC helps improve patients' quality of life by giving more freedom in meal planning.[9]

Monica Agarwal et al (2022) reveals that expert guidance using diet to help adults with type 2 diabetes attain improvement. Remission is defined as HbA1c below 6.5% for a least 3 months without surgery, devices, or diabetes medicines. Severe dietary intervention can lead to improvement in many adults with type 2 diabetes. Diets focusing on whole, plant-based foods and reduced animal products are more impactful. The specialist developed 69 consensus statement covering diet, support monitoring, weight management adherence and policy. These measures can help clinicians enhance care, lead protocol, and detect places requiring more research.[10]

METHODOLOGY

The Research proposed title "knowledge attitude and practice on diabetic friendly packaged foods among type 2 diabetes patients in Hyderabad "was presented to the ethical committee involving all the members of the department, valuable suggestions provided by the committee members were incorporated into the study design, ensuring a comprehensive and ethical sound research approach.

The data was collected from diabetic clinic located in Hyderabad City. Permission was taken from the diabetic clinic to collect information from the type 2 diabetic patients by standardized questionnaire.

STUDY DESIGN:

Thes research is a descriptive cross-sectional KAP study conducted in a health clinic in Hyderabad to assess the knowledge, attitude, and practice of diabetic friendly packaged foods among Type 2 Diabetes patients.

STUDY POPULATION:

The study included adults diagnosed with Type 2 Diabetes patients, aged above 18 years, residing in Hyderabad. both male and female participants were included.

STUDY PERIOD: 90 days

SAMPLING METHOD:

Convenience Sampling was used.

SAMPLE SIZE: 150

INCLUSION CRITERIA:

1. Adult ≥18 years diagnosed with type 2 diabetes mellitus.
2. Resident of Hyderabad over ≥6 months.
3. Attending the specific clinic for T2DM management during the study period
4. Participants willing to take a part of study and have ability to read,
5. Understand, and complete questionnaire.

EXCLUSION CRITERIA:

1. Type 1 diabetes patients, gestational diabetes or other specific diabetes types
2. Pregnant / lactating women.
3. Severe comorbidities like physiological disorders, cognitive impairment or hearing/ visual limitations that hinder interviewing.

METHOD OF DATA COLLECTION:

Data were collected using structured questionnaire specifically designed for this study. the questionnaire included sections on:

RESEARCH INSTRUMENT:

The primary research instrument was a comprehensive questionnaire, divided into sections to cover demographic data, medical history, and their knowledge perception and practice about diabetic-friendly packaged foods. These questions were self-designed to suit the local population and study objectives.

DEMOGRAPHIC AND CLINICAL DATA: Information on age, gender, and other relevant characteristics was recorded. HbA1c levels were obtained from participants recent medical records to assess long term glycemic control

KNOWLEDGE: Assesses understanding of diabetic-friendly packaged foods, including reading nutrition labels, determining hidden sugar's, acknowledging healthy ingredients and knowing portion control in packaged food.

ATTITUDE: assesses perspectives and beliefs about intake of packaged foods for diabetes management.

PRACTICE: assesses actual behavioural tendencies connected to choosing and consuming these foods.

The questionnaire was administered in clinical and community settings after obtaining informed consent. Participation was voluntary, and confidentiality was maintained. Pre-testing of the questionnaire ensured clarity, appropriateness, and comprehension for the study population.

SAMPLE SIZECALCULATION:

The sample size was calculated using Cochran's formula

Population size = n

Confidence level (Z) = 95%

Margin of error (E)= 8%

n=Z2xp (1-p) / E2

n= (1.96)2× 0.5 × (1- 0.5) / (0.08)2

n= 3.8416 × 0.25 / 0.0064 = 150

Sample size is 150.

STATISTICAL ANALYSIS:

The data collected was compiled, organized, tabulated and statistically analysed using MS Excel and SPSS software (statistical package for the social sciences). The data was analysed using Chi square depending on the nature of the variable

For the quantitative data like age the range, mean, standard deviation and degree of freedom was calculated.

Mean is calculated by adding up all the values in a dataset and then dividing that total by the number of values. It represents the average or central value that best summarizes the data. It is calculated by; For n values: x1, x2, …, xn x / n

Maximum value in the dataset is the largest number; it is denoted as Max and Minimum value is the smallest number in the dataset and is denoted by Min. Standard deviation measures the degree to which the data values deviate from the mean.

It can be calculated by; s = √∑(xi-x-) 2 / n-1.

CHI-SQUARE TEST:

In statistics chi square test is used to test a hypothesis against a data set of absorbed components it assesses weather the differences that arise between the two are genuine are merely result of random error when there is a categorical variable from a random sample, the Chi- test can be applied.

	value	df	Asymp. Sig (2-tailed)
Pearson Chi-square	7.657 7.803	2	.022
Likelihood ratio	.062	2	.020
Linear - by - linear Association		1	.803
N of valid cases	30		

The Chi-square (χ^2) test was applied to examine the association between the categorical variables of the study. Specifically, it was used to evaluate whether the levels of an attitude, and knowledge regarding diabetic-friendly packaged foods differed significantly across demographic and clinical characteristics of the participants, such as age group, gender, educational status, occupation, and duration of diabetes. The Chi-square test assisted to identify in case variations in KAP classifications were mathematically relevant. a p-score of 0.05 was considered mathematically significant.

STATISTICAL ANALYSIS:

The data for the study was collected from adults diagnosed with type 2 Diabetes from a diabetic clinic in Hyderabad. following careful verification and correction of inconsistencies, the dataset was analyzed to evaluate KNOWLWDGE, ATTITUDE AND PRACTICE ON DIABETIC FRIENDLY PACKAGED FOODS AMONG TYPE 2 DIABTES PATIENTS. The findings are represented below, with interpretations and discussions highlighting the clinical and behavioural implications of the observed patterns

TABLE 1 Distribution of participants by age

Age	
Mean	48.15
Median	45.5
Mode	45
Std. Deviation	14.141
Minimum	22
Maximum	85

The mean age of the patients is about 48 years, with ages ranging from 22 to 85 years.

The median age is around 45 years and the most common age is 45 years, indicating many patients are in middle adulthood.

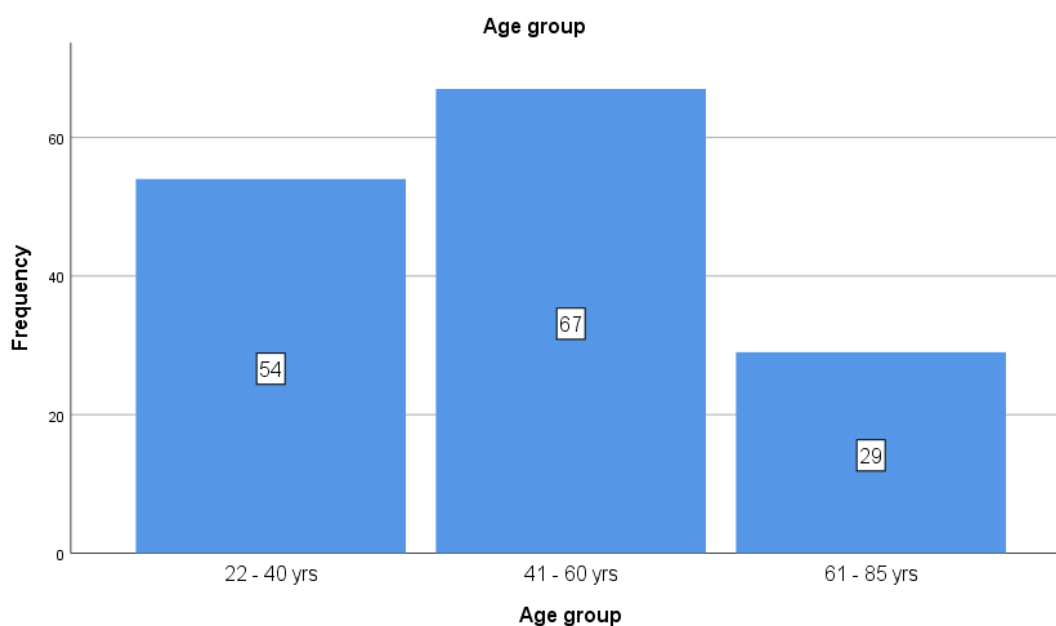
Table 2: Distribution if participants by age group

Age group	Frequency	Percent
22 - 40 yrs	54	36
41 - 60 yrs	67	44.7
61 - 85 yrs	29	19.3
Total	150	100

II n the 22-40 years group there are 54 patients, forming 36% of the sample.

In the 41-85 years group there are 29 patients, making up 19.3% of the sample.

Figure 2: Box graph of participants based on age groups



The bar chart visually compares these three age groups, with the tallest bar 41-60 years, followed by 22-40 years, and the shortest bar 61-85 years.

This displays the most diabetic patients in the study are middle-aged [41-60 years], with fewer younger and older patients.

Table 3: Distribution of Participants by Gender

Gender	Frequency	Percent
Male	71	47.3
Female	79	52.7
Total	150	100

Figure 3 : Bar graph for age paraghraph in study population

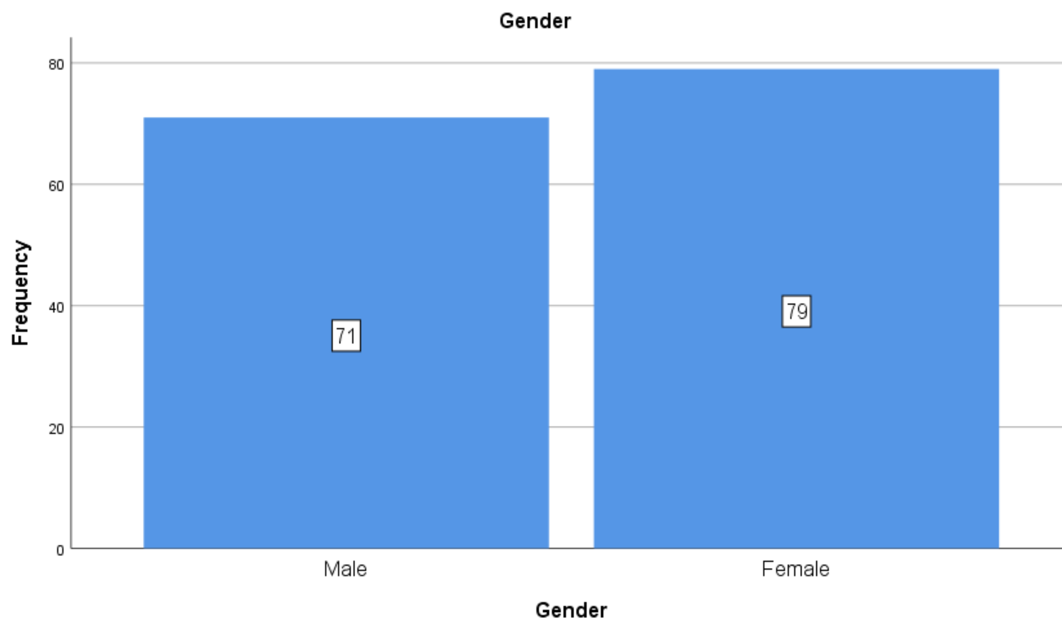


Table 3 presents the gender distribution of the study participants out of 150 individuals, 71% were male and 79% were female, displaying a slight predominance of males in the sample.

Table 4: Distribution of participants by Education Qualification

Educational Status	Frequency	Per cent
No formal Education	8	5.3
Primary	30	20
Secondary	45	30
Graduate	47	31.3
Post Graduate	20	13.3
Total	150	100

Figure 4: Bar graph for participants by Education Qualification

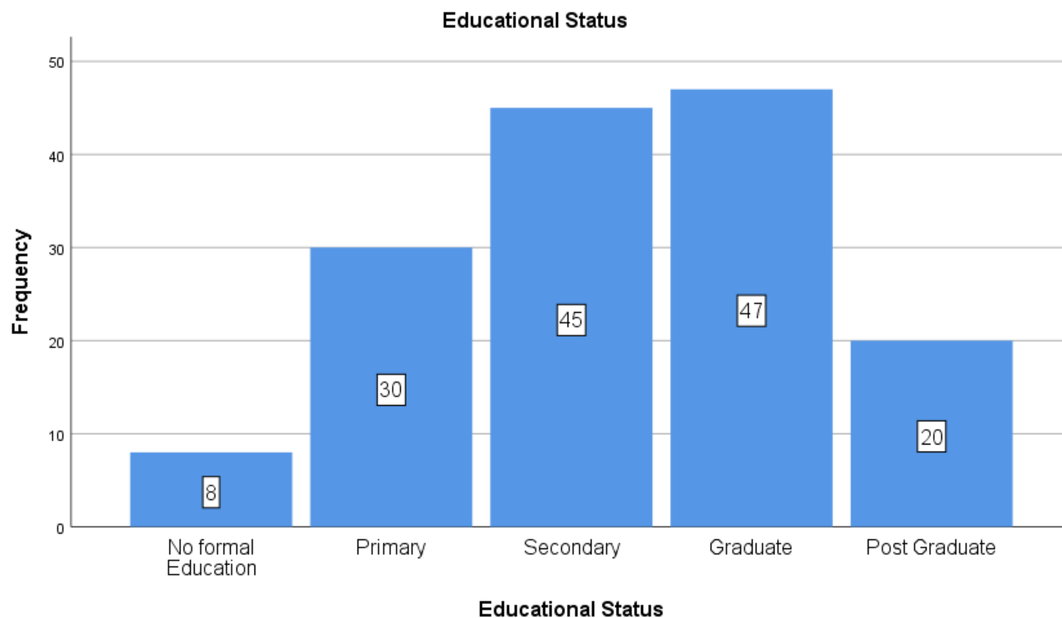


Table 4 presents the educational background of the participants. The largest portion of the participants are from graduate [47%], besides that 45% had secondary education, 30% had primary education, 20% were Post Graduate and 8% had no formal education.

Tabel 5: Distribution of participants by occupation

Occupation	Frequency	Percent
Business Man	54	36
Corporate	5	3.3
Housewife	65	43.3
Teacher	22	14.7
Driver	4	2.7
Total	150	100

Figure 5: Bar graph of participants by occupation

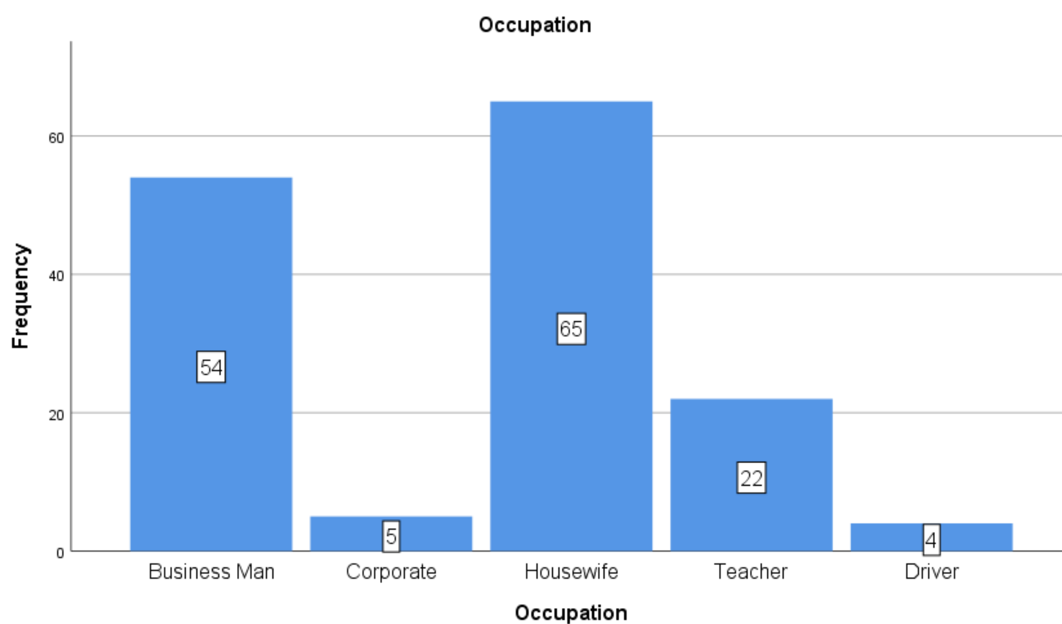


TABLE 5: presents the largest group is housewives formed of 65 participants with 43,3% of the sample, followed by businessman formed of 54 participants with 36%, and teachers consisted of 22 participants with 14.7%, while corporate employees formed of 5 participants with 3.3% and drivers consisted of 4 participants with 2,7%. Most of the participants are housewives and businessmen, with very few in corporate jobs and driving occupation.

TABLE 6: Distribution of participants by duration of diabetes

Duration of Diabetes	Frequency	Per cent
<1 year	20	13.3
1-5years	92	61.3
6-10 Years	25	16.7
>10 Years	13	8.7
Total	150	100

FIGURE 6: Bar graph of participants by duration of diabetes

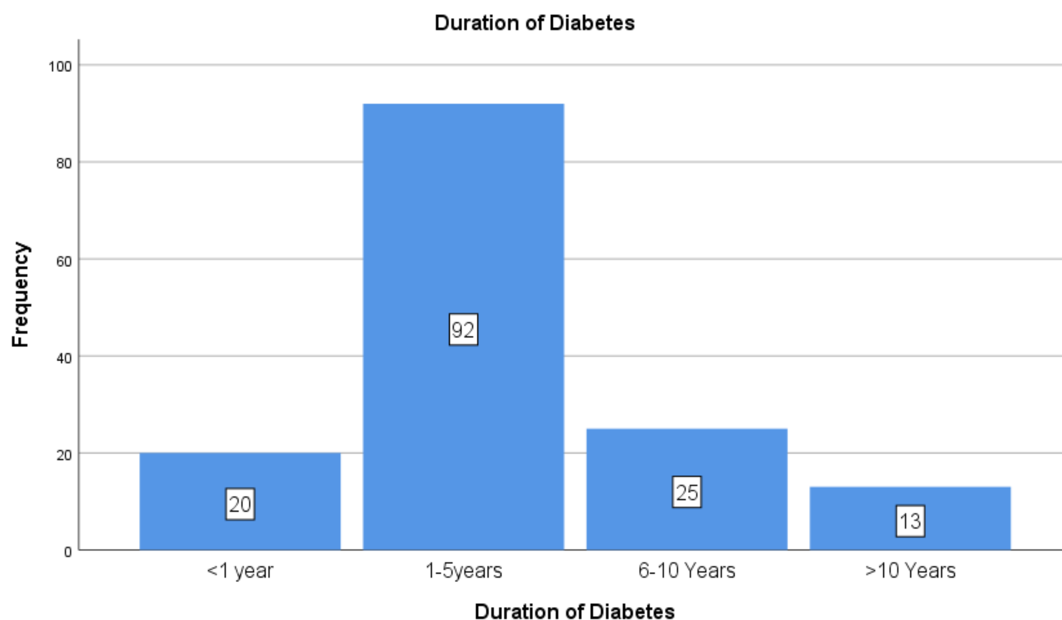


TABLE 6: presents majority of the participants 61.3% had a diabetes duration of 1-5 years, indicating that most cases were of relatively recent onset. A smaller proportion 13.3% had duration less than 1 years, while 16.7% and 8.7% had diabetes for 6-10 years and more than 10 years, respectively. The patterns suggest that long-standing diabetes cases are fewer in the study cohort and that findings will reflect early to mid-stage disease

TABLE 7: Distribution of participants by current treatment

Current Treatment	Frequency	Percent
Diet Only	16	10.7
Oral Medication	114	76
Insulin	10	6.7
Combination Therapy	10	6.7
Total	150	100

FIGURE 7: Bar graph of participants by current treatment

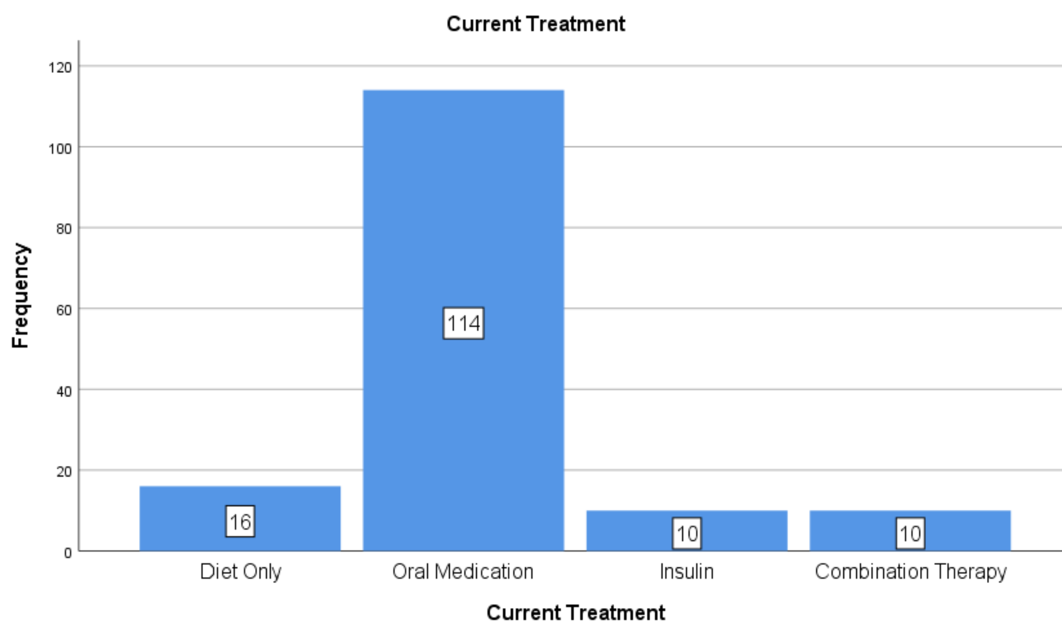


Table 7 shows the current treatment of participants, among 150 participants, the majority 76% were on oral medications and 10.7% were managing diabetes with diet alone, showing limited dependence on non-pharma logical therapy. Insulin therapy and combination therapy were each used by 6.7% of patients.

KNOWLEDGE

TABLE 8: Distribution of participants by who heard about diabetic-friendly packaged foods

Response	Frequency	Per cent
Yes	142	94.7
No	8	5.3
Total	150	100

Figure 8: Bar graph of participants by who heard about diabetic-friendly packaged foods

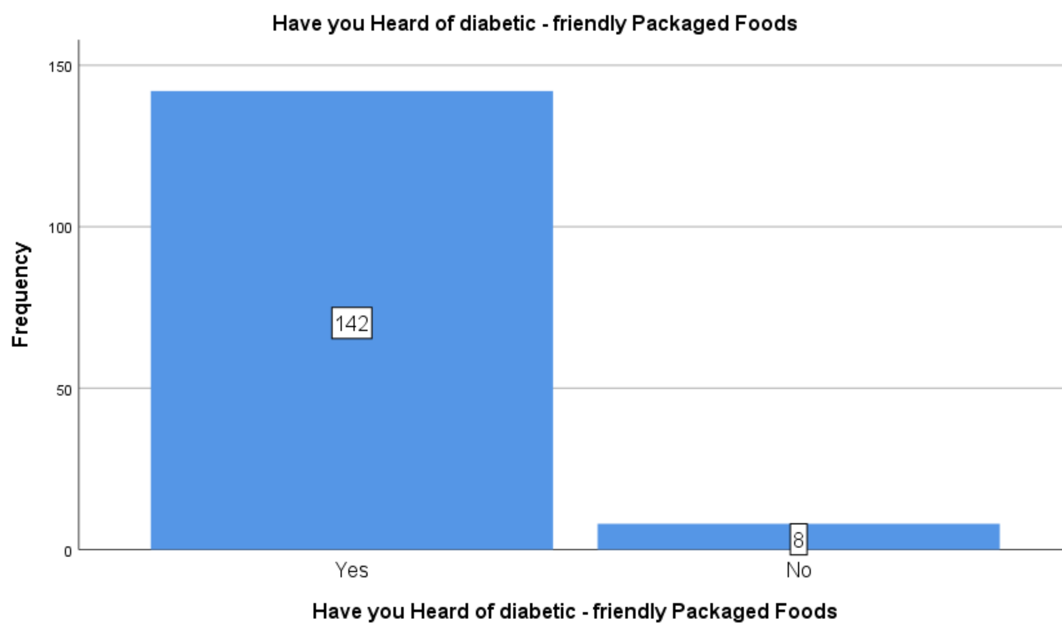


Table 8 shows how many participants heard of diabetic- friendly foods, the findings shows that a large majority of participants 94.7% have heard of diabetic-friendly packaged foods, while only a small proportion 5.3% reported that they have not heard. The small percentage of participants who are unaware highlights the need for continued education to ensure the individuals with diabetes have adequate knowledge about suitable food options that support better glycemic control

Table 9: Distribution of participants by what they think about diabetic-friendly packaged foods from the following

Option	Frequency	Percent
Sugar-free biscuits	49	32.7
Sugar substitutes	45	30
High-fibre snacks	50	33.3
Diet namkeens	6	4
Total	150	100

Figure 9: Bar graph of participants by what they think about diabetic-friendly foods from the following

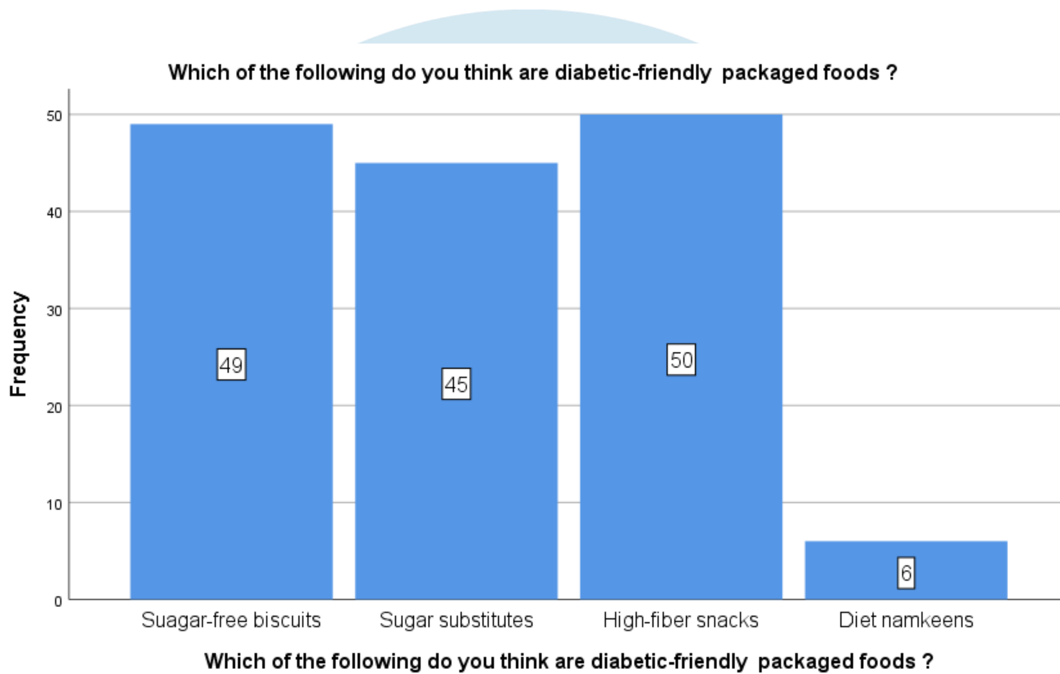


Table 9 shows how many participants think what is actual a diabetic-friendly packaged food is, 33.3% patients assume high fibre snacks are diabetic-friendly packaged foods, 32.7% of patients think sugar-free biscuits and 30% of them think sugar substitutes are diabetic-friendly packaged food' these highlights most of the participants think high fibre snacks are the diabetic friendly, and very few think diet namkeen are friendly food

Table 10: Distribution of participants by ability of reading nutrition labels on packaged foods

Response	Frequency	Percent
Yes	136	90.7
No	14	9.3
Total	150	100

Figure 10: Bar graph of participants by ability of reading nutrition labels on packaged foods

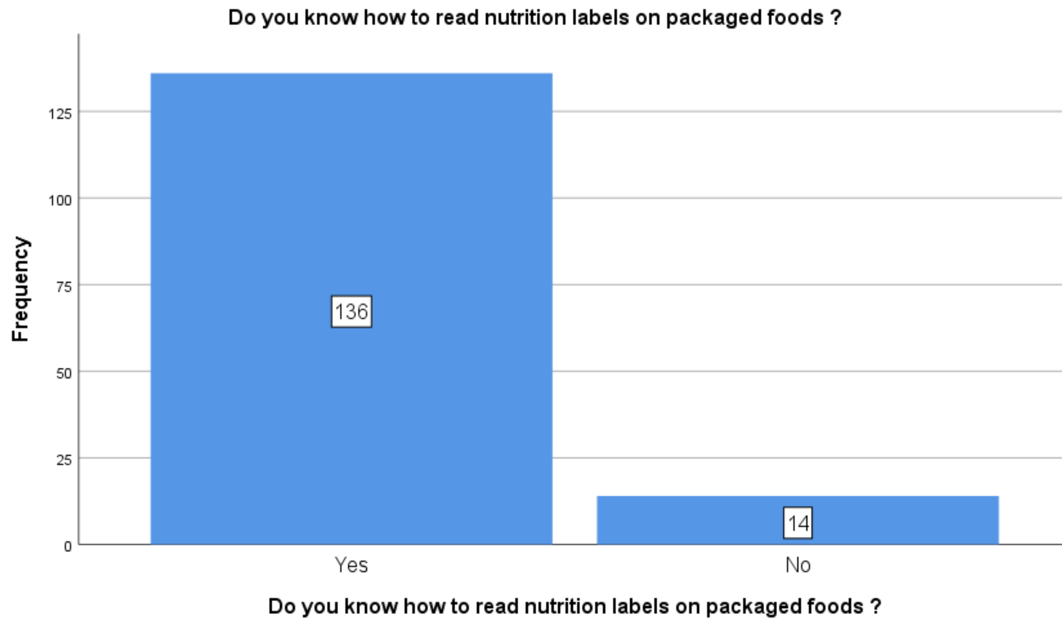


Table 10 shows how many participants know how to read nutrition labels on packaged foods,90% of patients know how to read the label, 9.3% of patients don't know how to read the labels. This highlight shows most of the participants are educated regarding label reading, and very few who don't read the label.

Table 11: Distribution of participants based on their perception of unlimited sugar-free consumption

Response	Frequency	Percent
Yes	17	11.3
No	92	61.3
Don't Know	41	27.3
Total	150	100

Figure 11: Bar graph of participants based on their perception of unlimited sugar-free consumption

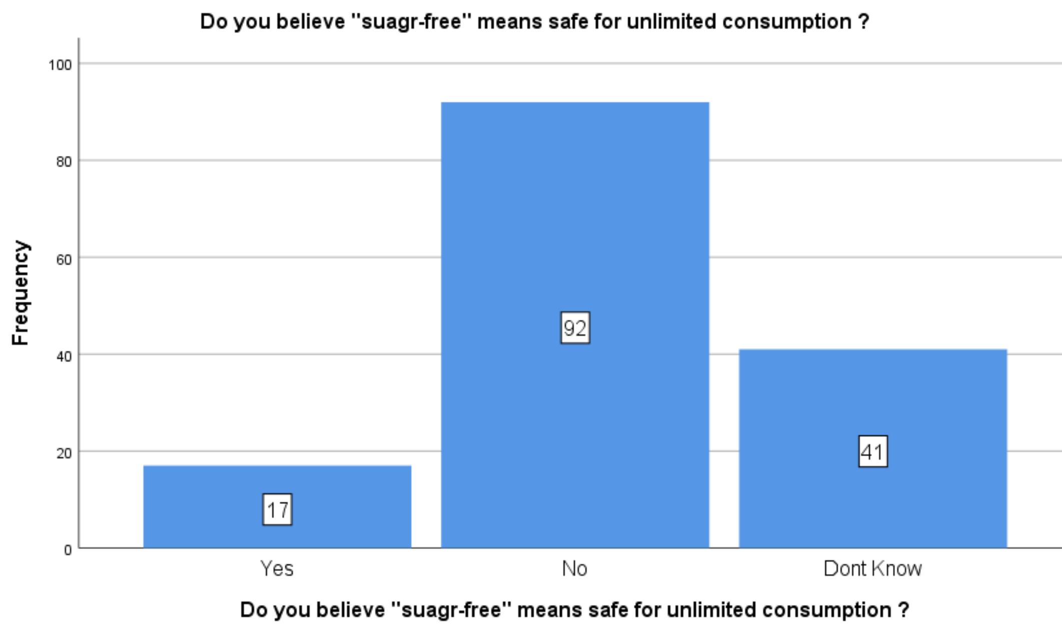


Table 11 shows how many participants feel about unlimited sugar free consumption, 61.3% of patients believe its not safe for unlimited consumption, 27.3% of patients don't have knowledge about it, and 11.3% of patients believe that it is safe. These findings show the most participants were cautious and aware that sugar free does not mean risk free.

Table 12: Distribution of participants by the nutrient they consider important on packaged foods for diabetes management

Nutrient	Frequency	Percent
Carbohydrates	68	45.3
Protein	30	20
Fats	3	2
Fiber	39	26
Not sure	10	6.7
Total	150	100

Figure 12: Bar graph of participants by the nutrients they consider important on packaged foods for diabetes management

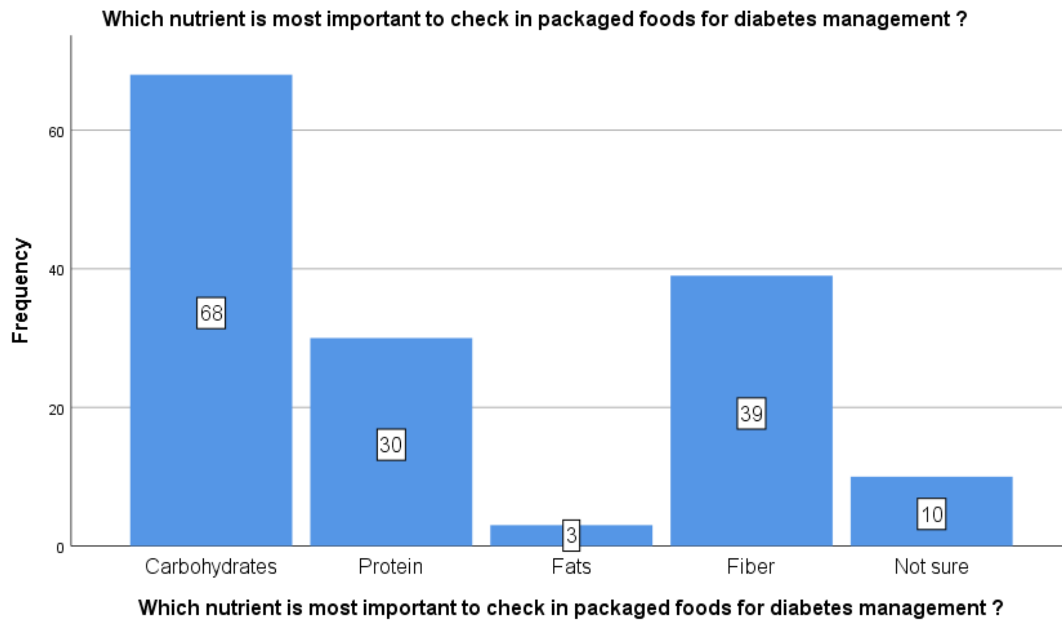


Table 12 shows how many participants consider which nutrient is most important to check in packaged foods for diabetes management, 45.3% of people check carbohydrates, 26% of them check fibre, 20% of people check protein, 6.7% of people are not sure about any of them, and 2% of the check fats as important nutrient to check in packaged foods. Most participants focus on carbohydrates when choosing packaged foods for diabetes management, while fewer consider fibre, protein, or fats. A small number are unsure about which nutrient to check

Table 13: Distribution of participants based on their awareness of artificial sweeteners used in packaged foods

Response	Frequency	Percent
Yes	129	86
No	21	14
Total	150	100

Figure 13: Bar graph of participants based on their awareness of artificial sweeteners used in packaged foods

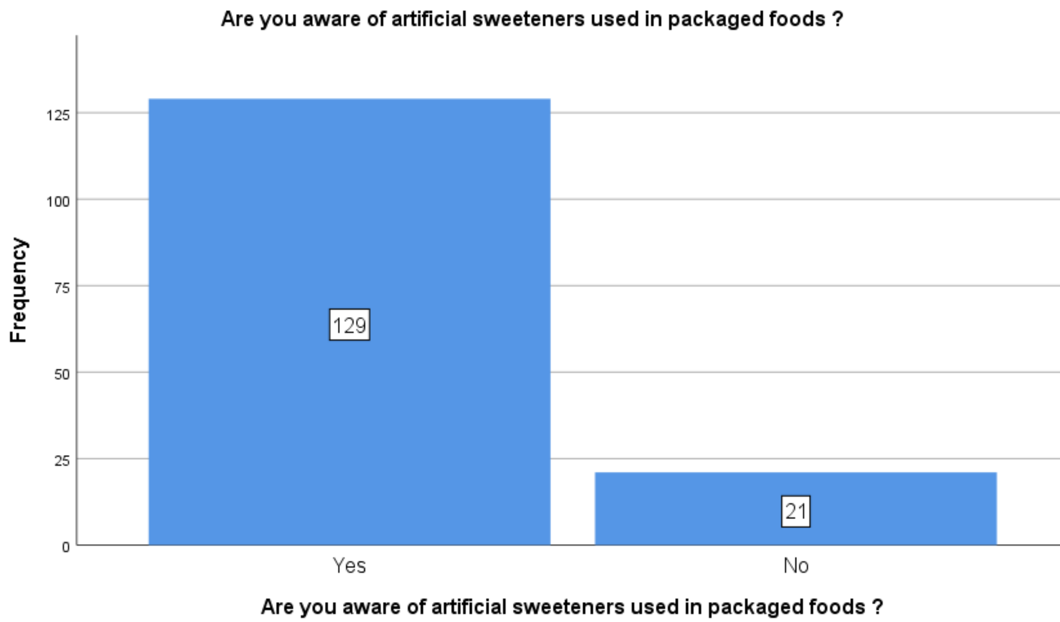


Table 13 shows how many participants are aware of artificial sweeteners used in packaged foods, among 150 participants 86% of them are aware of it and 14% of the participants are not aware of it. The majority show good awareness regarding ingredients used in diabetes related packaged foods

Table 14: Distribution of participants by their belief about whether diabetic-friendly foods are truly safe

Response	Frequency	Percent
Yes	25	16.7
No	53	35.3
Not sure	72	48
Total	150	100

Figure 14: Bar graph of participants by their belief about whether diabetic-friendly foods are safe

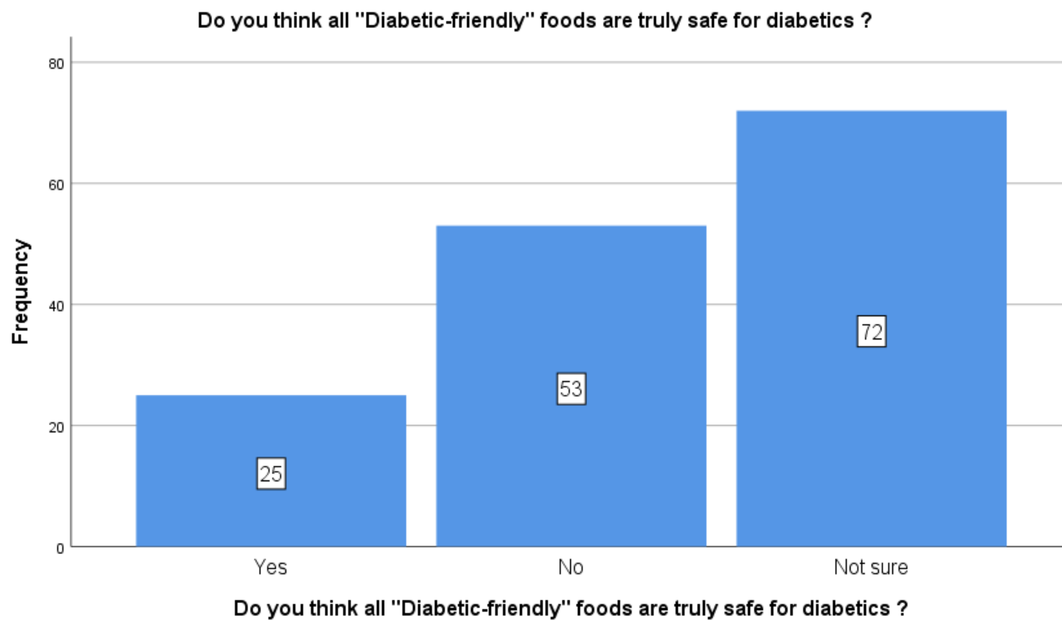


Table 14 shows participants belief about the diabetic-friendly foods are truly safe for diabetes, among 150 participants, 48% participants were not sure about it, 35.3% of them don't feel safe, and 16.7% of them feel safe about diabetic-friendly foods. The results show a lack of confidence and awareness regarding the safety of diabetic friendly packaged foods

Table 15: Distribution of participants by their understandings of portion size importance in diabetes-friendly packaged food

Response	Frequency	Percent
Yes	133	88.7
No	17	11.3
Total	150	100

Figure 15: Bar graph of participants by their understandings of portion size importance in diabetic-friendly packaged foods

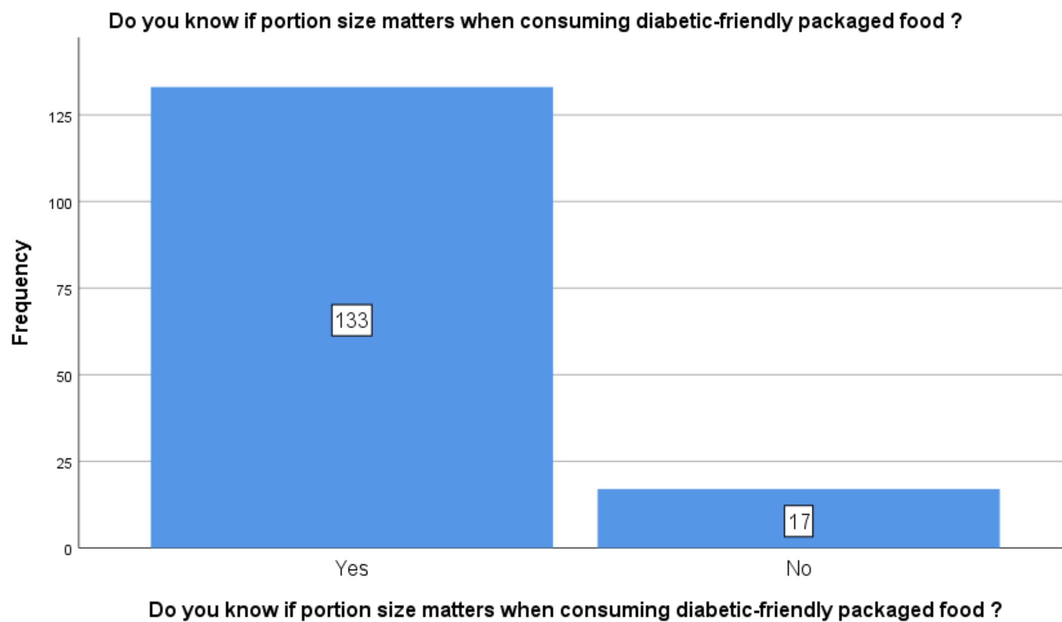


Table 15 shows participants by their understanding of portion size importance in diabetic-friendly packaged foods, 88.7% of participants know the portion size matters while consuming, and 11.3% of them don't know that portion is important. This indicated high awareness among participants regarding the importance of portion control, even when foods are labelled as diabetic-friendly

ATTITUDE

Table 16: Distribution of participants based on their trust in diabetic-friendly packaged food

Response	Frequency	Percent
Strongly agree	15	10
Agree	95	63.3
Neutral	29	19.3
Disagree	11	7.3
Total	150	100

Figure 16 Bar graph of participants based on their trust in diabetic-friendly packaged food

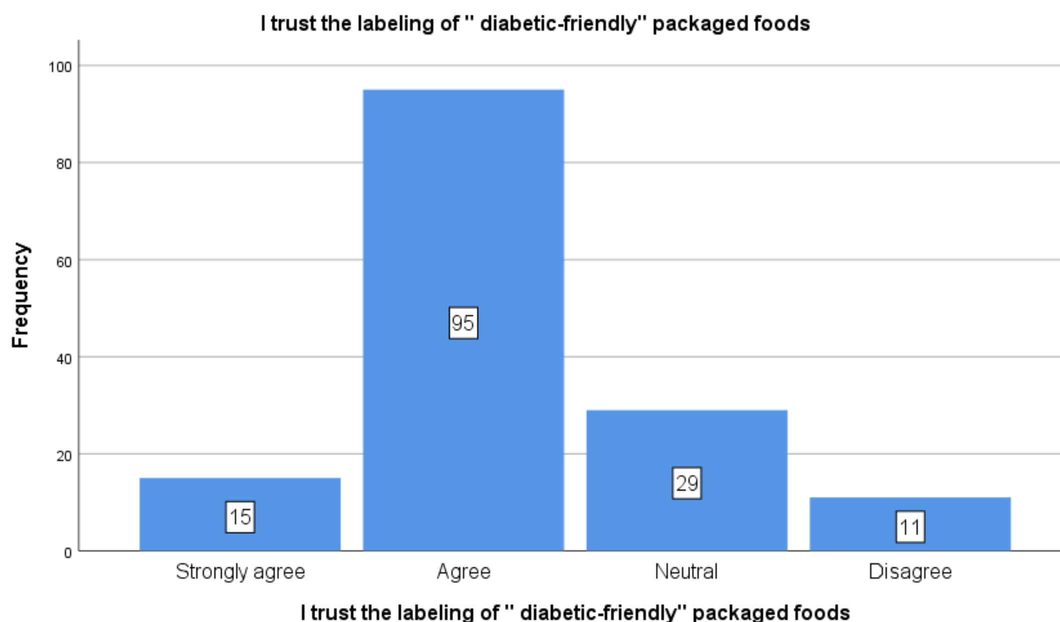


Table 16 shows that how much participants trust the labelling of diabetic-friendly packaged foods, among 150 participants, 63.3% of them agree to trust the labelling , 19.3% of them are neutral, 10% of them are strongly agreed to trust the label, 7.3% of them disagree to it. The result indicates generally positive trust toward the prouduct labeling among the participants.

Table 17: Distribution of participants based on their belief these foods help in better diabetes managmenet

Response	Frequency	Percent
Strongly agree	4	2.7
Agree	24	16
Neutral	67	44.7
Disagree	55	36.7
Total	150	100

Figure17: Bar graph of participants baed on their belief these foods help in better diabtes Management

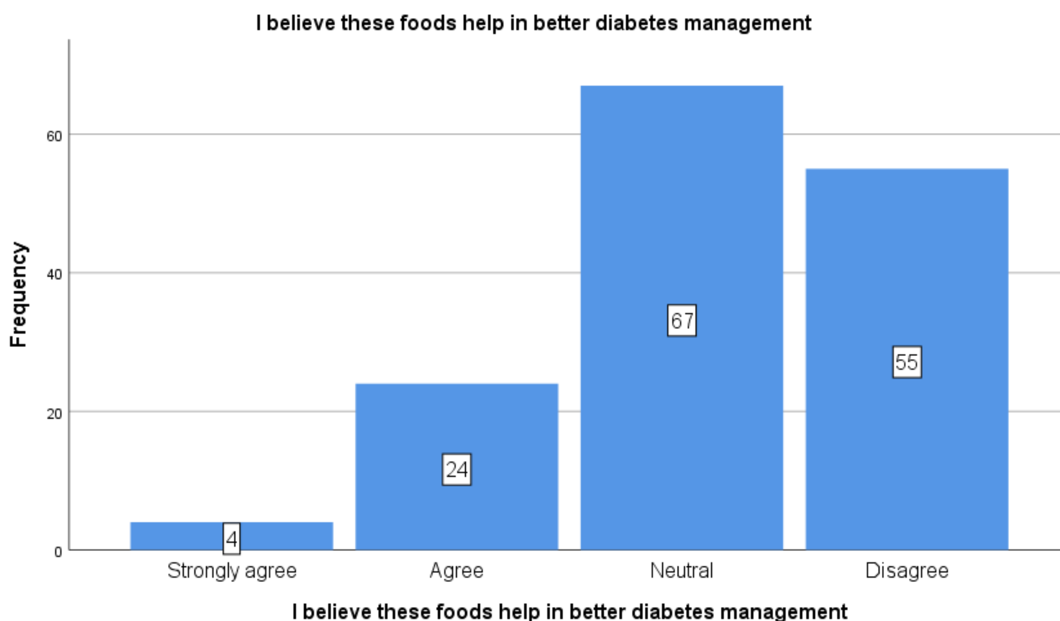
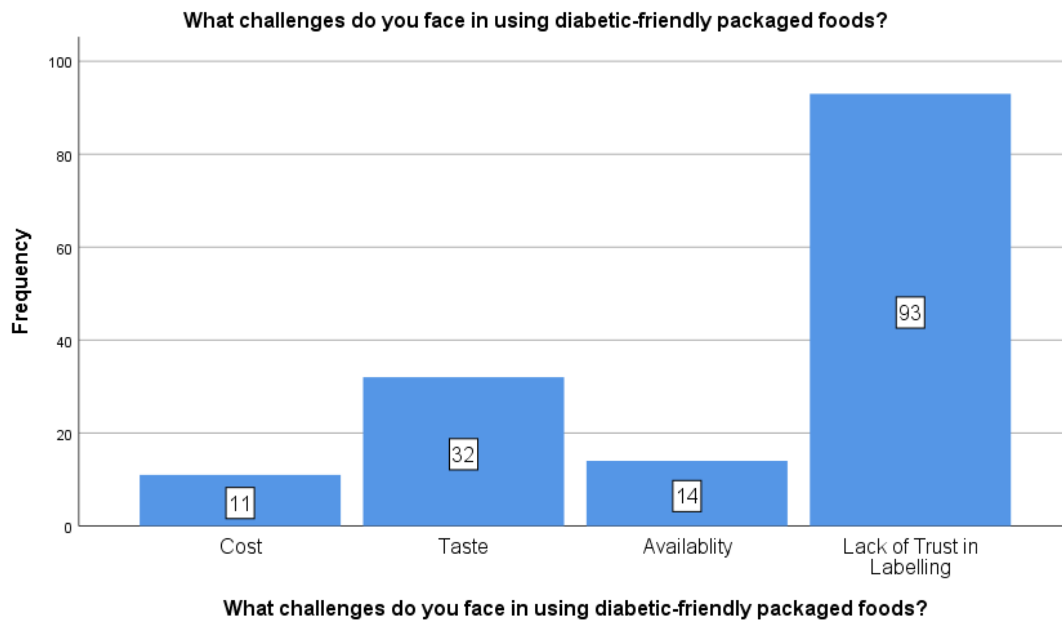


Table 17 shows that how much they belief these foods help in better diabetes managmnet, 44.7% of them are neutral, 36.7% of them disagreed to belief these foods, 16% of them agreed to belief, 2.7% of them straongly agreed to belief these foods .most of the participants do not believe diabetic friendly foods help in diabetes management, with only a few showing confidence in their benefits.

Table 18: Distribution of participants by the challenges faced in using packaged foods

Response	Frequency	Percent
Cost	11	7.3
Taste	32	21.3
Availability	14	9.3
Lack of Trust in Labelling	93	62
Total	150	100

Figure 18: Bar graph of participants by the challenges faced in using packaged foods



Tabel 18 shows how participants faced challenges while using packaged foods, among 150 participants 62% of them faced challenge because lack of trust in labelling, 21.3% of them faced challenge because of taste, and 7.3% of them faced challenge because of cost and 9.3% of them faced because of availability. This indicates that doubts about the credibility of diabetic friendly labelling are the predominant barrier more significant than sensory, economic, or access issues

Table 19: Distribution of participants based on their confidence that these products are safe for regular consumption by diabetic patients

Response	Frequency	Percent
Strongly agree	-	-
Agree	14	14
Neutral	91	91
Disagree	43	43
Strongly disagree	2	2
Total	150	100

Figure 19: Bar graph of participants based on their confidence that these products are safe for regular consumption by diabetic patients

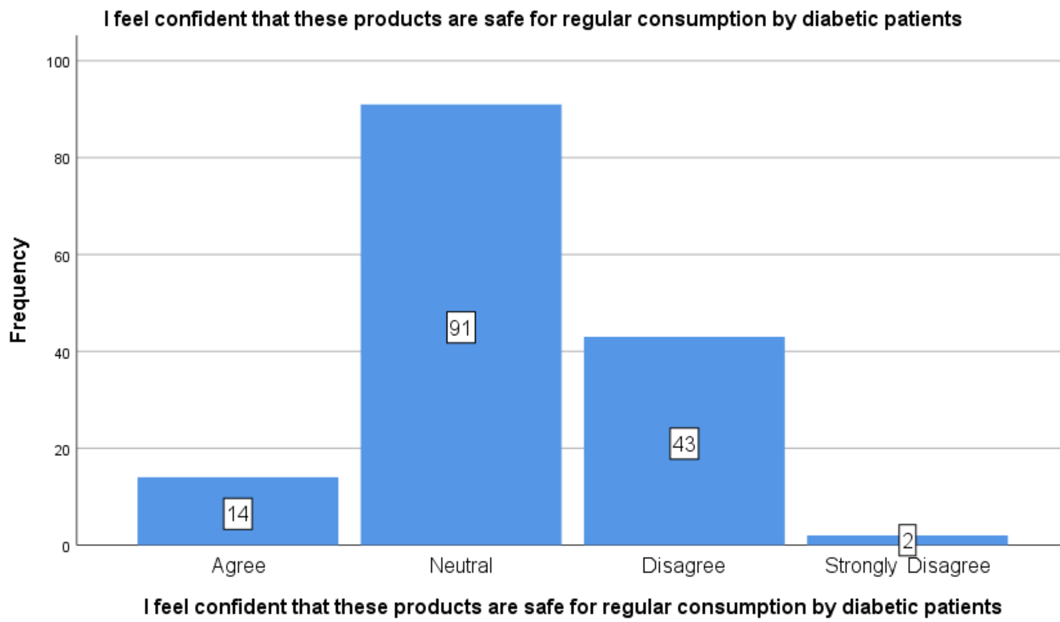


Table 19 shows that 91% of participants remained neutral about safety of these products for regular consumption, 43% of them disagreed, and 14% agreed only a small portion and 2% of them very few strongly Disagreed. The findings highlight the need for better education and clearer guidelines on safe consumption of such products

Table 20: Distribution of participants by their preference over foods

Response	Frequency	Percent
Agree	6	4
Neutral	35	23.3
Disagree	107	71.3
Strongly Disagree	2	1.3
Total	150	100

Figure 2o: Bar graph of participants by their preference over foods

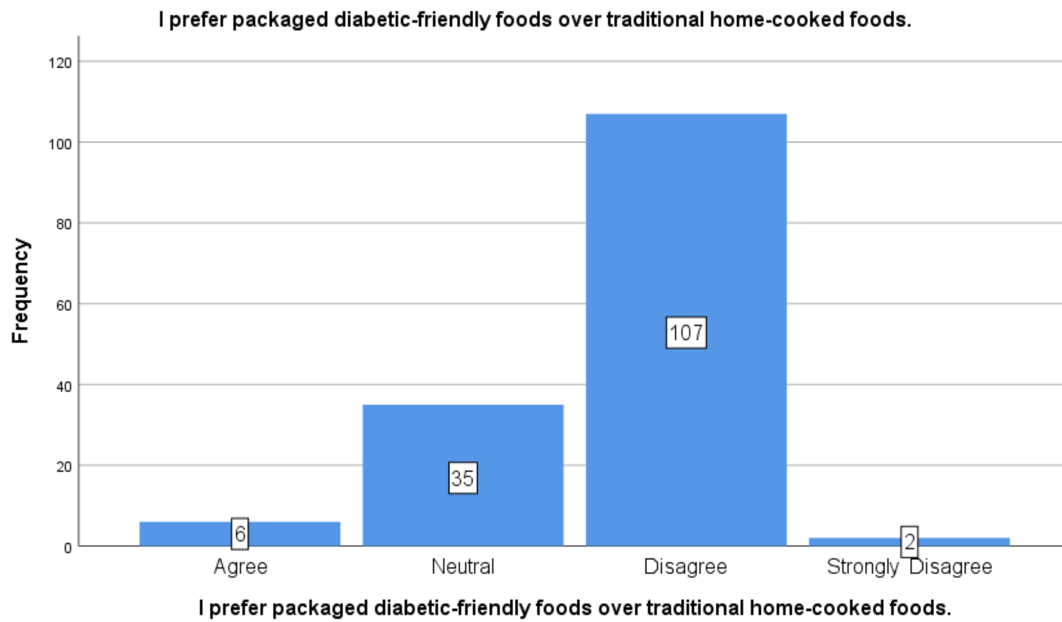


Table 20 shows the preference over food, among 150 participants 107% of them disagreed, 23.3%% of them are neutral, 4% of them agreed, 1.3% of them strongly disagreed. The majority of the participants do not prefer packaged diabetic friendly foods over traditional home cooked meals. Most either disagree or strongly disagree indicating a general preference for home cooked foods.

Table 21: Distribution of participants by their thought of consuming these foods regularly can reduce dependence on medicines.

Response	Frequency	Percent
Agree	4	2.7
Neutral	39	26
Disagree	105	70
Strongly Disagree	2	1.3
Total	150	100

Figure 21: Bar graph of participants by their thought of consuming these foods regularly can reduce dependence on medicines.

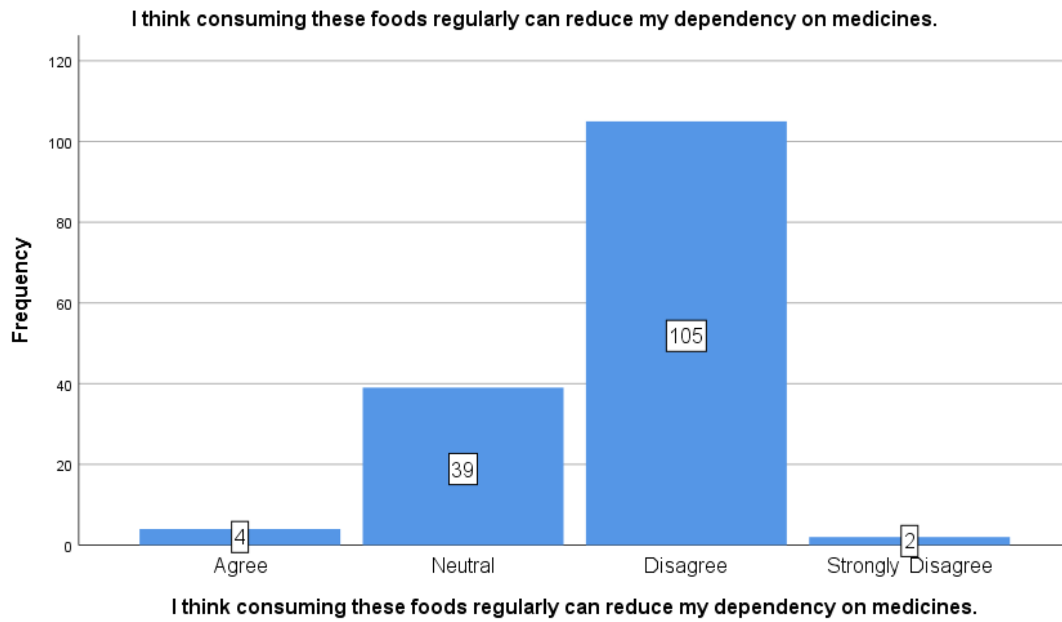


Table 21 shows that participants thought about consuming these foods regularly can reduce dependence on medicines, 70% of the participants disagreed to it, 26% of them were neutral, 2.7% of the participants are agreed to it, 1.3% of the participants strongly disagreed. The majority of the participants do not agree about consuming these foods regularly and other participants who agree are very few they need education on it

Table 22 Distribution of participants based on how concerned they are about the safety of artificial sweeteners in these foods

Response	Frequency	Percent
Strongly agree	23	15.3
Agree	101	67.3
Neutral	18	12
Disagree	7	4.7
Strongly Disagree	1	0.7
Total	150	100

Figure 22 Bar graph of participants based on how concerned they are about the safety of artificial sweeteners in these foods

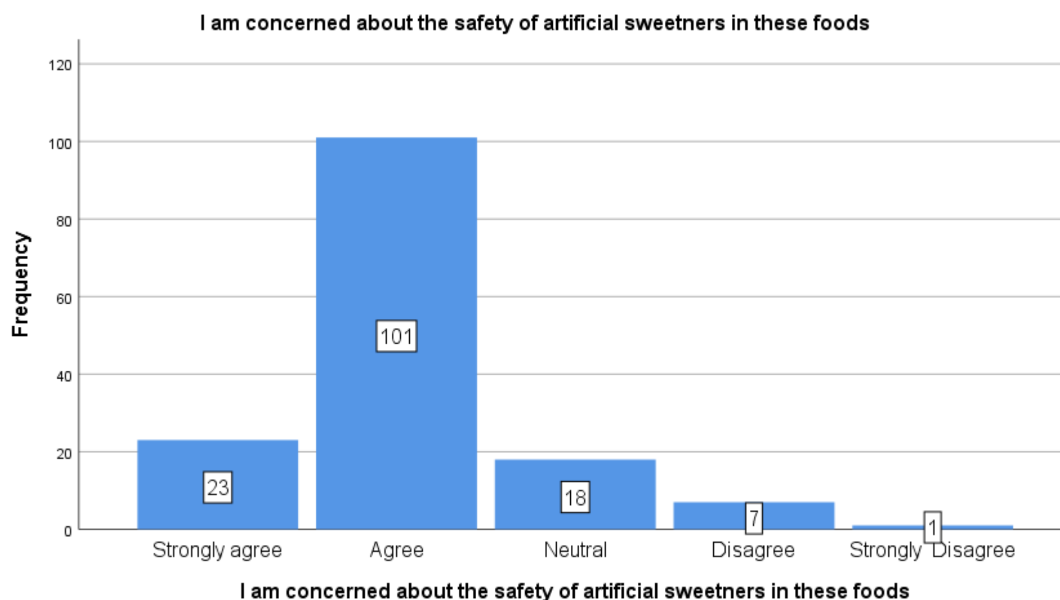


Table 22 shows the participants concern about the safety of artificial sweeteners in these foods, 67.3% of the participants are concerned about it, 15.3% of them strongly agreed to it, 12% of them were neutral, 4.7% of the participants disagreed to it, the majority of them were agreeing on it means they have knowledge about it, and some of them were neutral and strongly disagreed to it.

Table 23: Distribution of participants based on their doctors/dietitians encourages them to consume diabetic-friendly packaged food

Response	Frequency	Percent
Strongly agree	4	2.7
Agree	8	5.3
Neutral	30	20
Disagree	96	64
Strongly Disagree	12	8
Total	150	100

Figure 23: Bar graph of participants based on their doctors/dietitians encourages them to consume diabetic friendly packaged food

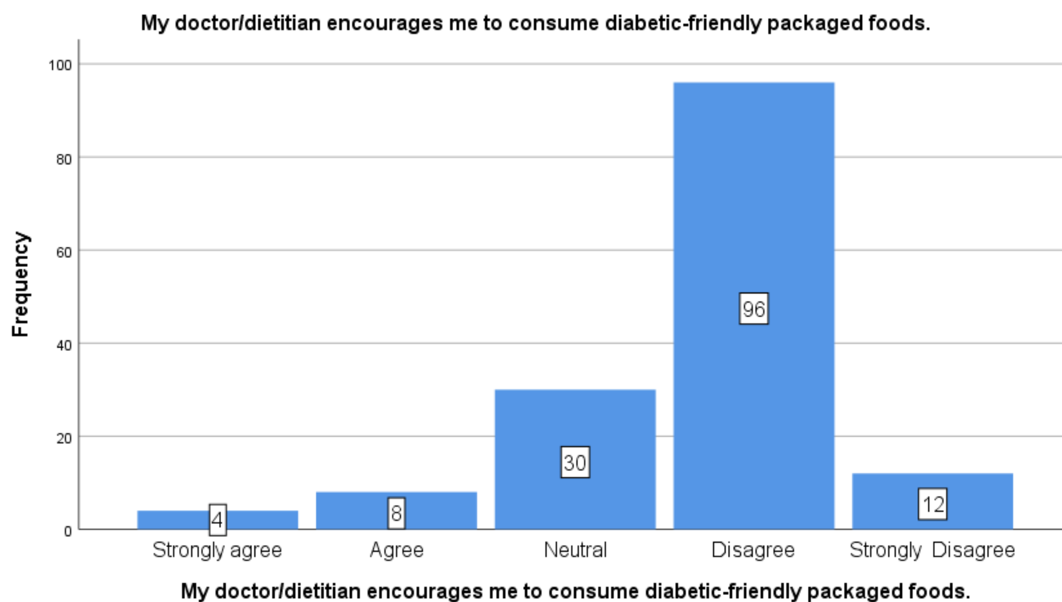


Table 23 shows that participants were encouraged by doctors/dietitians to consume diabetic-friendly packaged foods, 64% of the participants were disagreed to it, 20% of them were neutral, 8% of the participants were strongly disagreed to it, 5.3% of them were agreed to it, 2.7% of them strongly agreed, the majority of them disagreed that their doctors/dietitians do not encourage them, and some of them were neutral

Table 24: Distribution of participants based on whether they have ever replaced a meal with packaged diabetic-friendly foods

Response	Frequency	Percent
Often	8	5.3
Sometimes	15	10
Rarely	44	29.3
Never	83	55.3
Total	150	100

Figure 24: Bar graph of participants based on whether they have ever replaced a meal with packaged diabetic-friendly foods

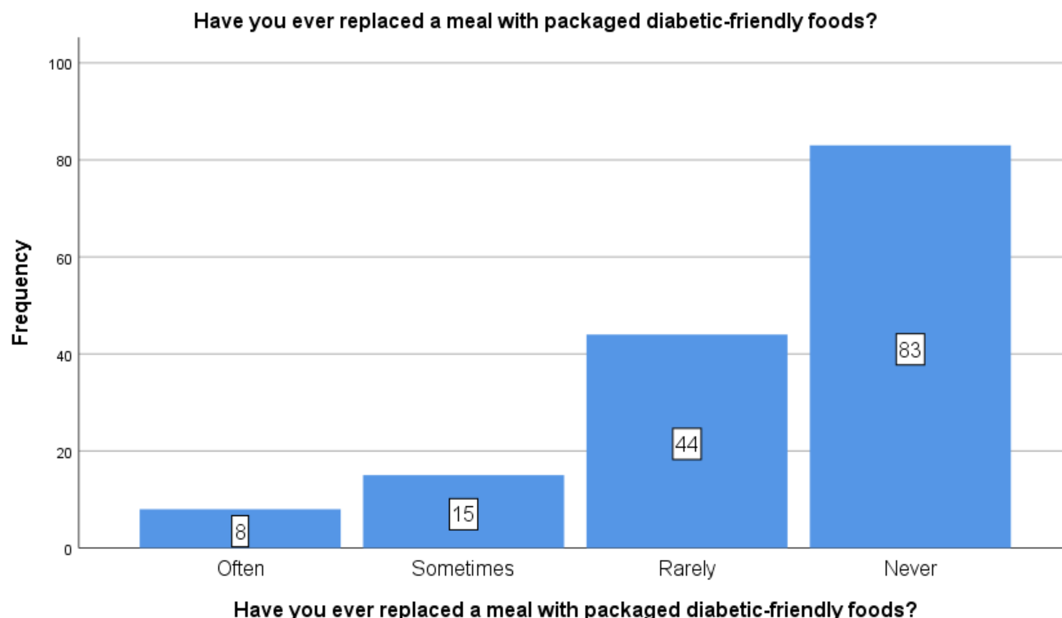


Table 24 shows that whether they ever replaced a meal with packaged diabetic-friendly foods, 55.3% of the participants never replaced a meal with packaged food, 29.3% of them used to replce rarely, 10% of them replaced only sometimes, 5.3% of the participants often replaced a meal, the majority of them never replaced a meal with packaged food and some of them replaced rarely

Table 25: Distribution of participants based on how often do they recommemded these foods to other diabetic patients

Response	Frequency	Percent
Always	4	2.7
Often	27	18
Sometimes	67	44.7
Rarely	31	20.7
Never	21	14
Total	150	100

Figure 25: Bar graph of participants based on how often they recommended these foods to other diabetic patients

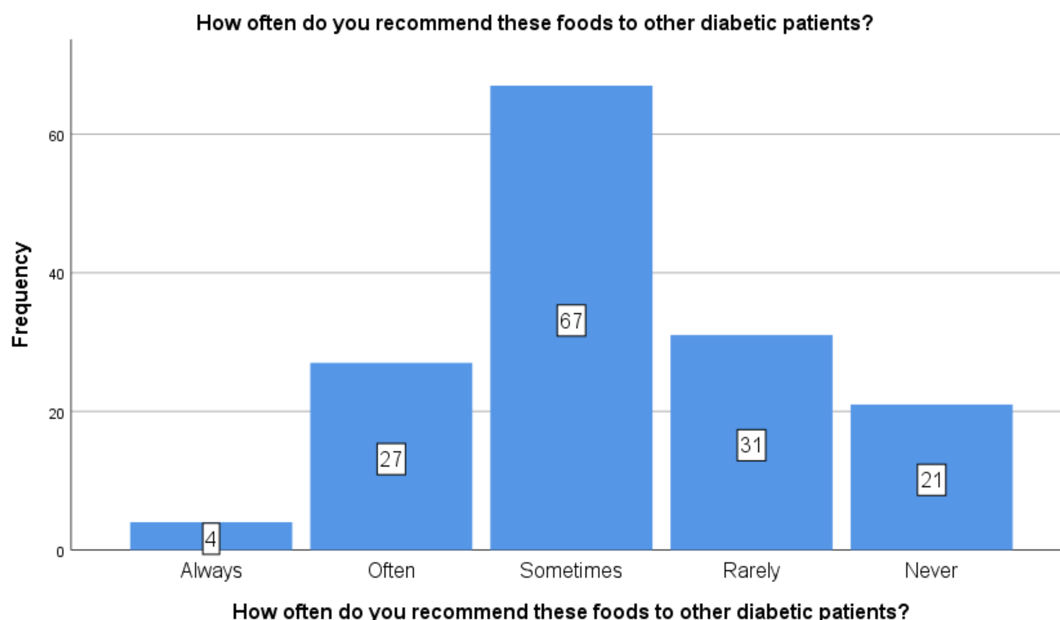
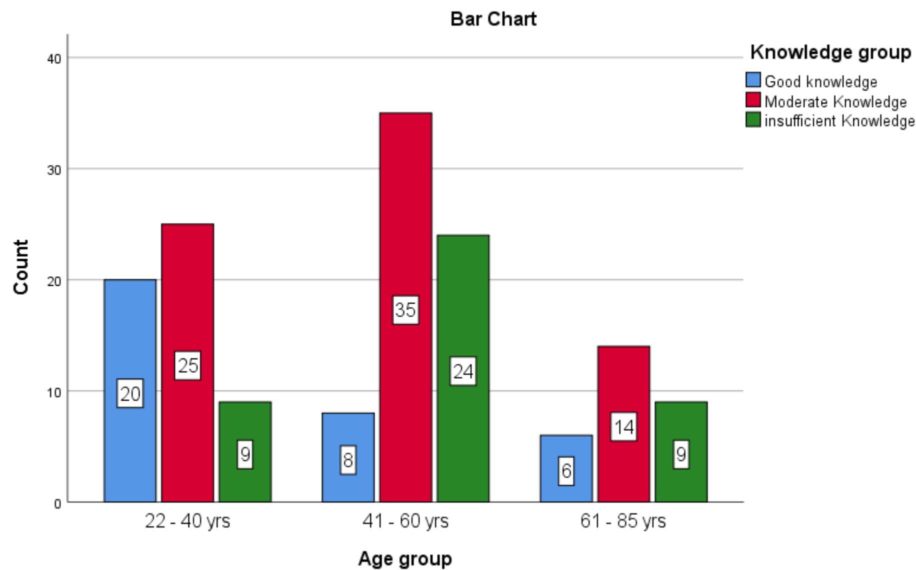


Table 25 shows that how often participants recommend these foods to other diabetic patients, about 44.7% of the participants recommended this packaged food only sometimes, 20.7% of them recommended this food rarely, 18% recommended often, 14% never recommended to others, 2.7% of participants always recommended these foods to others

Table 26: Distribution of knowledge levels across different age group

Age group	Good knowledge	Moderate Knowledge	insufficient Knowledge	Total
22 - 40 yrs	20	25	9	54
	37.00%	46.30%	16.70%	100.00%
41 - 60 yrs	8	35	24	67
	11.90%	52.20%	35.80%	100.00%
61 - 85 yrs	6	14	9	29
	20.70%	48.30%	31.00%	100.00%
Total	34	74	42	150
	22.70%	49.30%	28.00%	100.00%

Figure 26: Distribution and Comparison of knowledge levels by age group

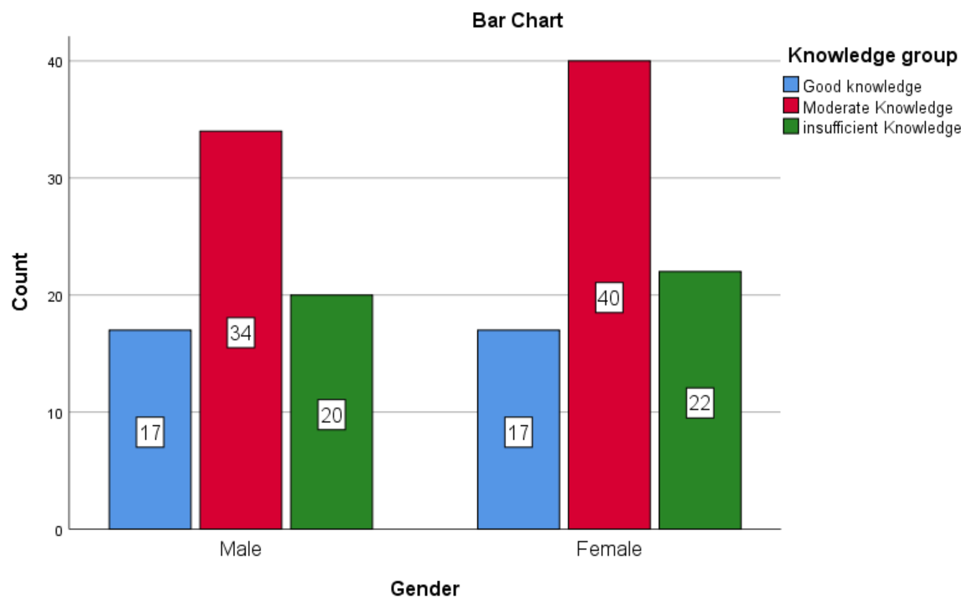


The findings show that most diabetic patients across all age groups have moderate knowledge about diabetes. The highest proportion of moderate knowledge (52.2%) is seen in the 41–60 years age group. Insufficient knowledge is also more common in this age group (35.8%). Younger adults (22–40 years) good better knowledge than the older groups, with 37% having good knowledge, while only 11.9% of the 41–60 age group have good knowledge. In the 61–85 years group, good knowledge is low (20.7%) and limited knowledge remains moderate (31%). Overall, the results indicate that many diabetic patients still need improved education, especially those in the middle-aged and older age groups.

Table 27: Distribution of knowledge levels by gender

Gender	Knowledge group			
	Good knowledge	Moderate Knowledge	insufficient Knowledge	Total
Male	17	34	20	71
	23.90%	47.90%	28.20%	100.00%
Female	17	40	22	79
	21.50%	50.60%	27.80%	100.00%
Total	34	74	42	150
	22.70%	49.30%	28.00%	100.00%

Figure 27: Distribution of knowledge levels by gender

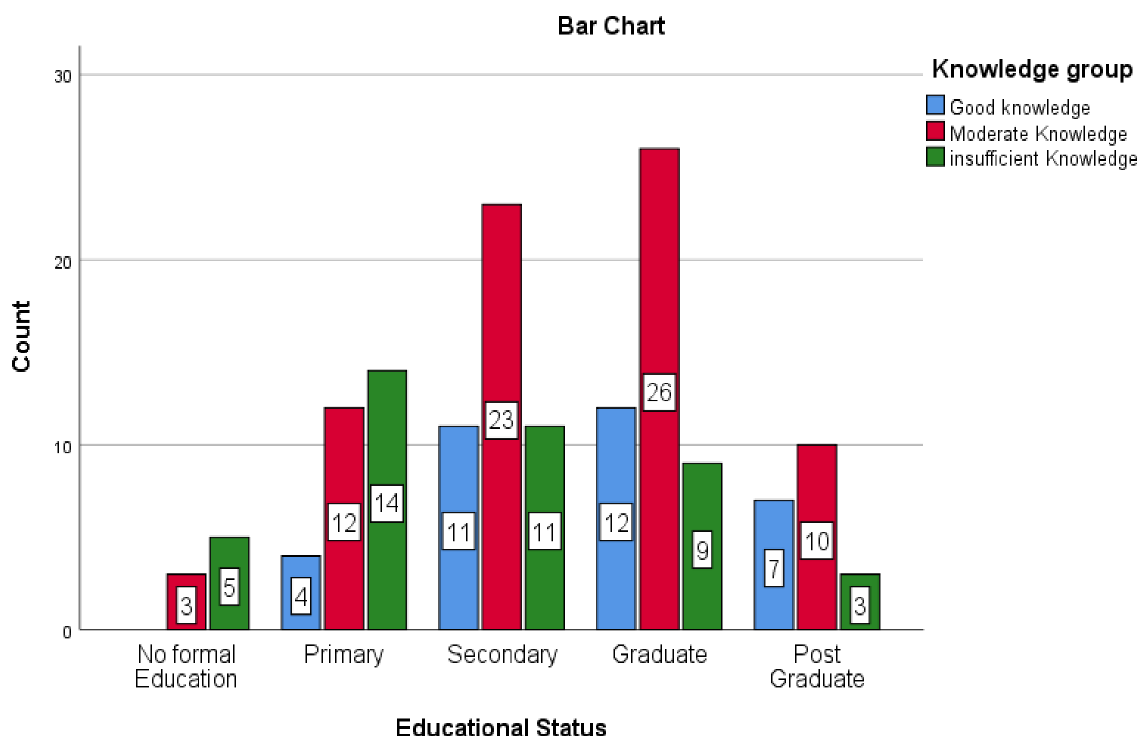


The table and bar chart show the distribution of knowledge levels among male and female participants. The results indicate that both genders most commonly had moderate knowledge, with 47.9% of males and 50.6% of females falling into this group. A smaller proportion in each gender had good knowledge (males 23.9%, females 21.5%). Similarly, insufficient knowledge was seen in 28.2% of males and 27.8% of females. Overall, the pattern is almost the same in both groups, showing no major difference between males and females in knowledge level. The chi-square test value ($\chi^2 = 1.56$, $p = 0.925$) confirms that there is no statistically essential connection across gender and knowledge level. This means gender does not influence the level of knowledge among the participants.

Table 28: Distribution of knowledge levels according to educational status

Educational Status	Knowledge group			
	Good knowledge	Moderate Knowledge	insufficient Knowledge	Total
No formal Education	0	3	5	8
	0.00%	37.50%	62.50%	100.00%
Primary	4	12	14	30
	13.30%	40.00%	46.70%	100.00%
Secondary	11	23	11	45
	24.40%	51.10%	24.40%	100.00%
Graduate	12	26	9	47
	25.50%	55.30%	19.10%	100.00%
Post Graduate	7	10	3	20
	35.00%	50.00%	15.00%	100.00%
Total	34	74	42	150
	22.70%	49.30%	28.00%	100.00%

Figure 28: Distribution of knowledge levels by educational status



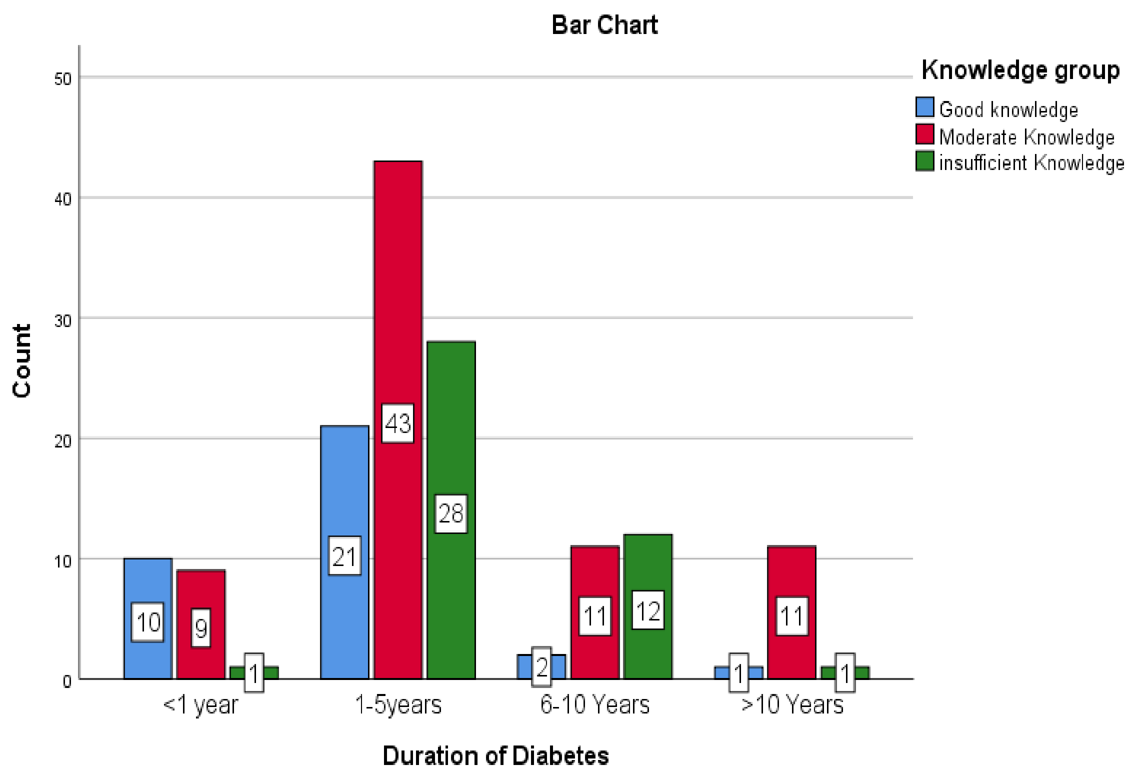
Educational status shows a clear positive association with knowledge level, and knowledge categories can be interpreted using standard percentage ranges. Knowledge Ranges in many KAP studies, knowledge is categorized with Bloom's cut-off as: good knowledge when respondents score 80–100% of the maximum score, moderate knowledge when they score 60–79%, and poor or insufficient knowledge when they score below 60%. Brief interpretation of table In the "no formal education" group, most respondents fall in the insufficient knowledge range (<60%), while none reach the good knowledge range (80–100%).

From primary to postgraduate level, the proportion in good (80–100%) and moderate (60–79%) knowledge ranges steadily increases and the insufficient range (<60%) decreases, and this difference across educational categories is statistically significant ($\chi^2 = 15.53$, df = 8, p = 0.05), indicating education is significantly associated with knowledge level.

Table 29: Distribution of knowledge levels according to duration of diabetes

Duration of Diabetes	Knowledge group			
	Good knowledge	Moderate Knowledge	insufficient Knowledge	Total
<1 year	10	9	1	20
	50.00%	45.00%	5.00%	100.00%
1-5years	21	43	28	92
	22.80%	46.70%	30.40%	100.00%
6-10 Years	2	11	12	25
	8.00%	44.00%	48.00%	100.00%
>10 Years	1	11	1	13
	7.70%	84.60%	7.70%	100.00%
Total	34	74	42	150
	22.70%	49.30%	28.00%	100.00%

Figure 29: Distribution of knowledge levels across duration of diabetes



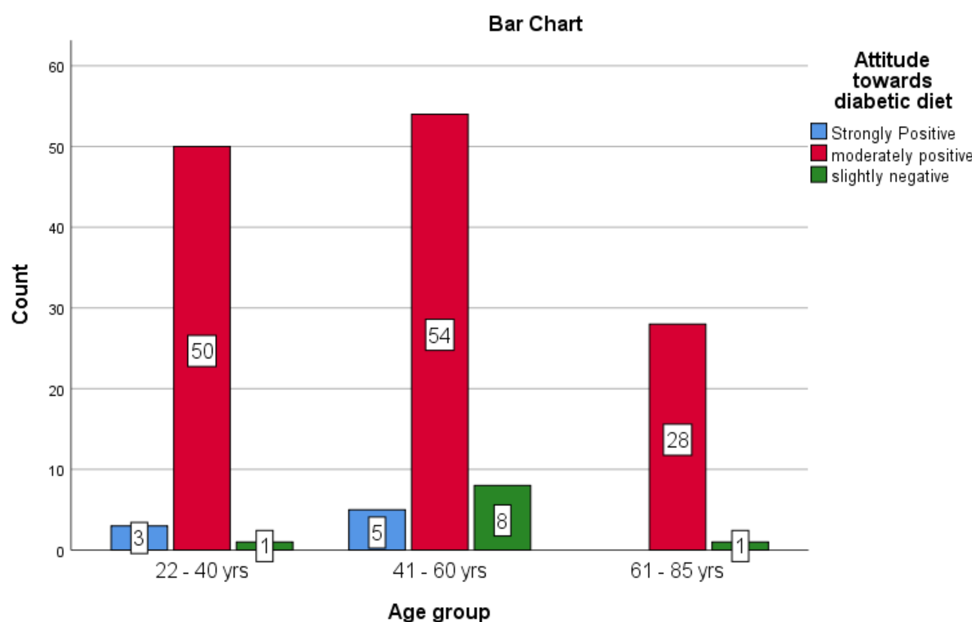
The table shows a statistically significant association between duration of diabetes and level of knowledge about diabetes ($\chi^2 = 23.337$, df = 6, p = 0.001) .Short Discussion among patients with duration <1 year, half had good knowledge and nearly half had moderate knowledge, with very few showing insufficient knowledge, suggesting that recently diagnosed patients are relatively well informed .

In the 1–5 year group, moderate knowledge predominates, while the proportion with insufficient knowledge increases compared to the <1 year group, indicating that knowledge may plateau or decline without continuous education over time .For 6–10 years of diabetes, most participants have moderate or insufficient knowledge, and only a small fraction retain good knowledge, implying that long-term patients may not receive or retain adequate ongoing self-care information .In those with >10 years duration, almost all have only moderate knowledge with very few in good or insufficient categories, which may reflect partial understanding built over time but not enough reinforcement to reach a “good” level

Table 30: Distribution of attitude levels towards diabetic diet by age group

Age group	Strongly Positive	moderately positive	slightly negative	Total
22 - 40 yrs	3	50	1	54
	5.60%	92.60%	1.90%	100.00%
41 - 60 yrs	5	54	8	67
	7.50%	80.60%	11.90%	100.00%
61 - 85 yrs	0	28	1	29
	0.00%	96.60%	3.40%	100.00%
Total	8	132	10	150
	5.30%	88.00%	6.70%	100.00%

Figure 30: Distribution of attitude levels according to age group



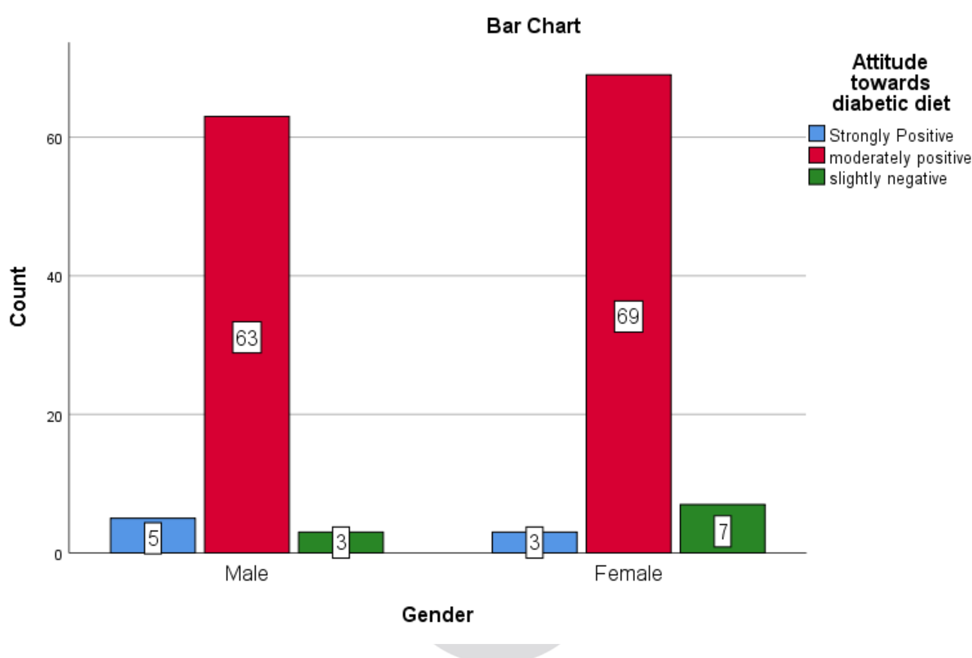
The results show that all age groups mostly had a moderately positive attitude toward a diabetic diet. In the 22–40 years group, almost all participants (92.6%) showed a moderately positive attitude. In the 41–60 years age range, 80.6% also had a moderately positive attitude, although this group had slightly higher strongly positive and slightly negative responses compared to the younger group. In the 61–85 years group, the majority (96.6%) were moderately positive, with almost no strongly positive responses. Overall, across the

age ranges from 22 to 85 years, most participants showed a moderately positive attitude toward diabetic diet, and the chi-square value indicates no significant association between age and attitude levels.

Table 31: Distribution of attitude towards diabetic diet according to gender wise

Gender	Attitude towards diabetic diet			
	Strongly Positive	moderately positive	slightly negative	Total
Male	5	63	3	71
	7.00%	88.70%	4.20%	100.00%
Female	3	69	7	79
	3.80%	87.30%	8.90%	100.00%
Total	8	132	10	150
	5.30%	88.00%	6.70%	100.00%

Figure 31: Bar graph showing gender wise distribution of attitude towards a diabetic diet

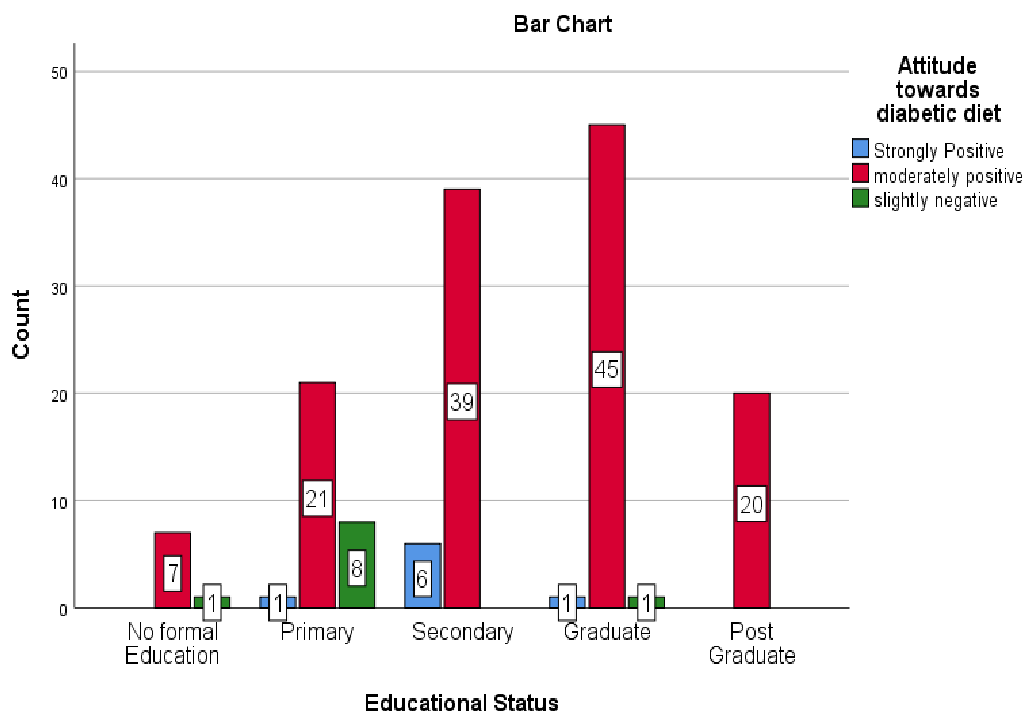


The findings show that both males and females mostly had a moderately positive attitude toward a diabetic diet. Among males (71 participants), 88.7% were moderately positive, while 7% were strongly positive and 4.2% were slightly negative. Similarly, among females (79 participants), 87.3% were moderately positive, 3.8% strongly positive, and 8.9% slightly negative. Across the full range of both gender groups, the pattern remains consistent: the majority fall within the “moderately positive” category. The chi-square value indicates no significant association between gender and attitude toward a diabetic diet, meaning both males and females show similar attitude ranges.

Table 32: Distribution of knowledge scores by educational status

Educational Status	Attitude towards diabetic diet			
	Strongly Positive	moderately positive	slightly negative	Total
No formal Education	0	7	1	8
	0.00%	87.50%	12.50%	100.00%
Primary	1	21	8	30
	3.30%	70.00%	26.70%	100.00%
Secondary	6	39	0	45
	13.30%	86.70%	0.00%	100.00%
Graduate	1	45	1	47
	2.10%	95.70%	2.10%	100.00%
Post Graduate	0	20	0	20
	0.00%	100.00%	0.00%	100.00%
Total	8	132	10	150
	5.30%	88.00%	6.70%	100.00%

Figure 32: Bar graph shows knowledge level across different educational categories



The results show a clear pattern that attitude toward a diabetic diet improves with higher education levels. In the no formal education group (n = 8), most participants (87.5%) showed a moderately positive attitude, but 12.5% were slightly negative. In the primary level (n = 30), 70% were moderately positive, while a higher 26.7% were slightly negative, indicating more mixed attitudes. In the secondary group (n = 45), the attitude strengthened, with 86.7% showing a moderately positive response and none being negative. Among graduates

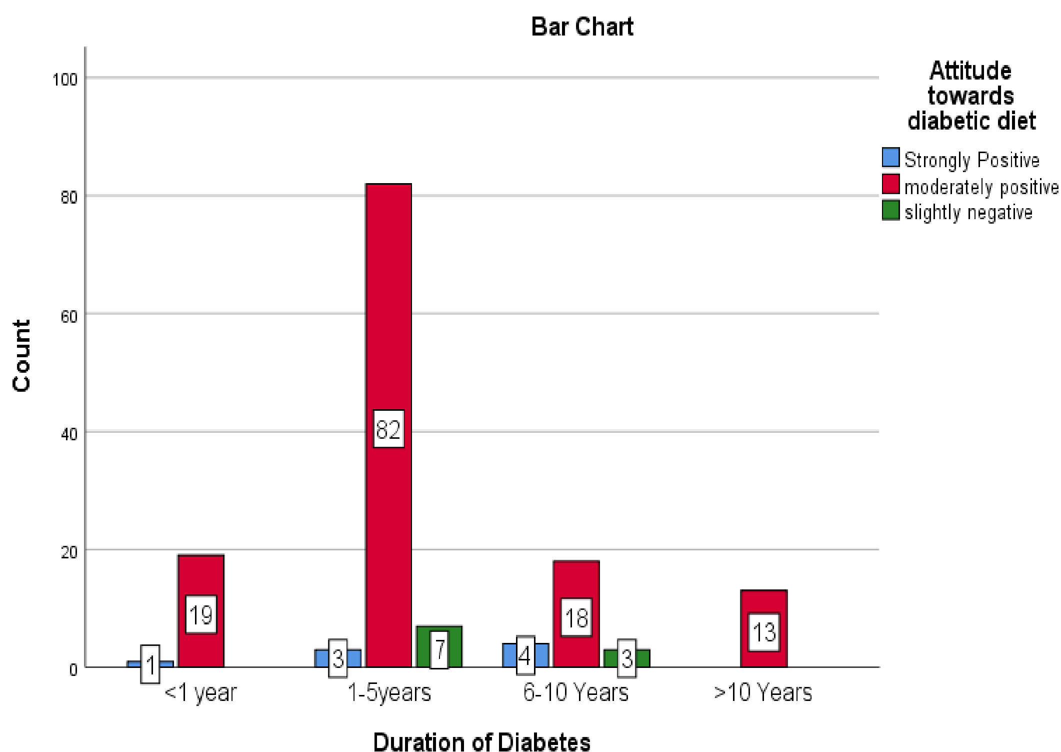
(n = 47), 95.7% were moderately positive, showing one of the highest positive ranges. In post-graduates (n = 20), 100% showed a moderately positive attitude, showing the strongest positive response across all groups.

Overall, across the full educational range, from no formal education to post-graduate level, the proportion of moderately positive attitudes increases, while slightly negative attitudes decrease. The chi-square test shows a significant association between education and attitude, indicating that higher educational status is linked with more positive attitudes toward a diabetic diet.

Table 33: Distribution of attitude towards diabetic diet according to duration of diabetes

Duration of Diabetes	Attitude towards diabetic diet			
	Strongly Positive	moderately positive	slightly negative	Total
<1 year	1	19	0	20
	5.00%	95.00%	0.00%	100.00%
1-5years	3	82	7	92
	3.30%	89.10%	7.60%	100.00%
6-10 Years	4	18	3	25
	16.00%	72.00%	12.00%	100.00%
>10 Years	0	13	0	13
	0.00%	100.00%	0.00%	100.00%
Total	8	132	10	150
	5.30%	88.00%	6.70%	100.00%

Figure 33: Bar graph shows attitude towards diabetic diet based on duration of diabetes



The findings show how the duration of diabetes influences attitude toward a diabetic diet. In those with <1 year of diabetes (n = 20), 95% had a moderately positive attitude, and none were negative. In the 1–5 years group (n = 92), 89.1% had a moderately positive attitude, but 7.6% showed a slightly negative attitude.

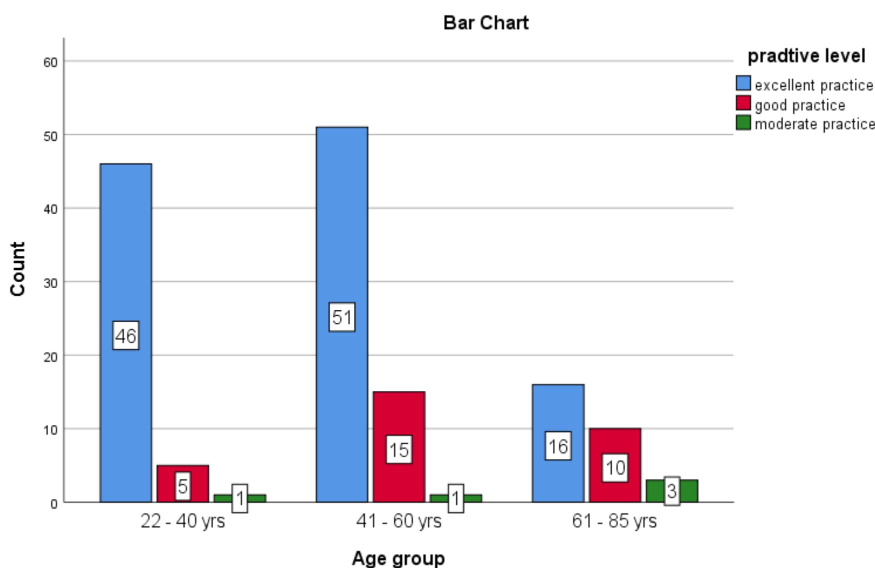
Among participants with 6–10 years of diabetes (n = 25), 72% were moderately positive, while 12% were slightly negative. This group also showed the highest proportion of strongly positive responses (16%). In those with >10 years duration (n = 13), 100% showed a moderately positive attitude, with no negative or strongly positive responses. Across all duration ranges, the majority remained in the moderately positive category. Slight negative attitudes were higher in the 1–5 years and 6–10 years ranges.

The chi-square value indicates no significant association between duration of diabetes and attitude, meaning attitude levels remain similar across different duration groups.

Table 34: Distribution of practice level according to age group

Age group	Practice level			
	excellent practice	good practice	moderate practice	Total
22 - 40 yrs	46	5	1	52
	88.50%	9.60%	1.90%	100.00%
41 - 60 yrs	51	15	1	67
	76.10%	22.40%	1.50%	100.00%
61 - 85 yrs	16	10	3	29
	55.20%	34.50%	10.30%	100.00%
Total	113	30	5	148
	76.40%	20.30%	3.40%	100.00%

Figure 34: Bar graph shows practice level across different age groups

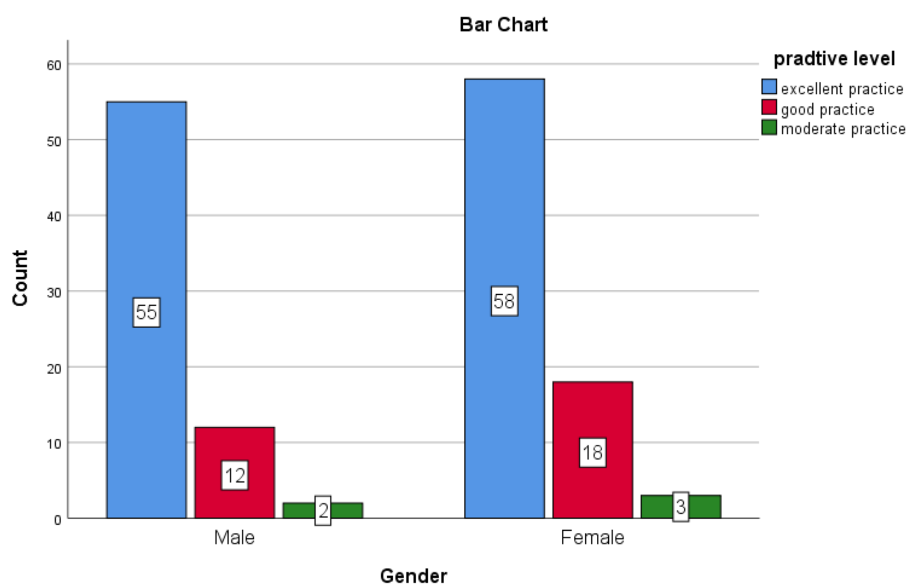


The results show that practice levels decline as age increases. In the 22–40 years group (n = 52), the majority (88.5%) had excellent practice, with only 9.6% showing good practice and 1.9% moderate practice. In the 41–60 years group (n = 67), excellent practice decreased to 76.1%, while 22.4% had good practice and 1.5% had moderate practice. In the 61–85 years group (n = 29), excellent practice dropped further to 55.2%, good practice increased to 34.5%, and 10.3% showed moderate practice. Across the full age range from 22 to 85 years, there is a clear pattern: Excellent practice decreases with age, Good and moderate practice increase with age. The chi-square test shows a significant association between age and practice level (p = 0.008), meaning age has an important influence on diabetic diet practice patterns.

Table 35: Distribution of practice level according to gender

Gender	practice level			
	excellent practice	good practice	moderate practice	Total
Male	55	12	2	69
	79.70%	17.40%	2.90%	100.00%
Female	58	18	3	79
	73.40%	22.80%	3.80%	100.00%
Total	113	30	5	148
	76.40%	20.30%	3.40%	100.00%

Figure 35: Bar graph shows practice level according to gender



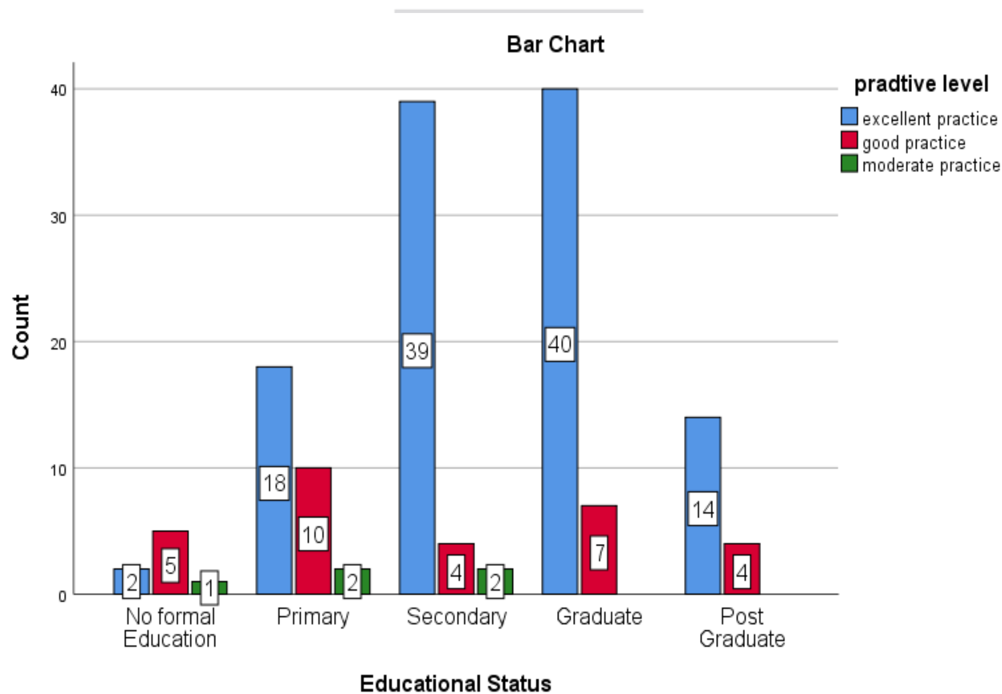
The results clearly show that practice levels improve with higher educational status. In the no formal education group (n = 8), only 25% had excellent practice, while 62.5% showed good practice and 12.5% moderate practice. In the primary education group (n = 30), excellent practice increased to 60%, while 33.3% had good practice and 6.7% moderate practice. Among those with secondary education (n = 45), 86.7% had excellent practice, with only 8.9% good and 4.4% moderate practice. In the graduate group (n = 47), 85.1% showed excellent practice, 14.9% had good practice, and none were in the moderate category. Among post-graduates (n = 18), 77.8% had excellent practice and 22.2% had good practice, with no moderate practice observed. Across the entire educational range, from no formal education to post-graduates, the proportion of

excellent practice increases, while moderate practice decreases sharply. The chi-square test shows a significant association (p = 0.003), indicating that higher education is strongly linked with better practice levels regarding diabetic diet.

Table 36: Distribution of practice level according to educational status

Educational Status	practice level			
	excellent practice	good practice	moderate practice	Total
No formal Education	2	5	1	8
	25.00%	62.50%	12.50%	100.00%
Primary	18	10	2	30
	60.00%	33.30%	6.70%	100.00%
Secondary	39	4	2	45
	86.70%	8.90%	4.40%	100.00%
Graduate	40	7	0	47
	85.10%	14.90%	0.00%	100.00%
Post Graduate	14	4	0	18
	77.80%	22.20%	0.00%	100.00%
Total	113	30	5	148
	76.40%	20.30%	3.40%	100.00%

Figure 36: Bar graph shows practice level across different educational levels



The table shows that practice levels vary clearly across different educational groups. Across all categories, excellent practice is the most common, ranging from 25% to 86.7% depending on education level. Participants

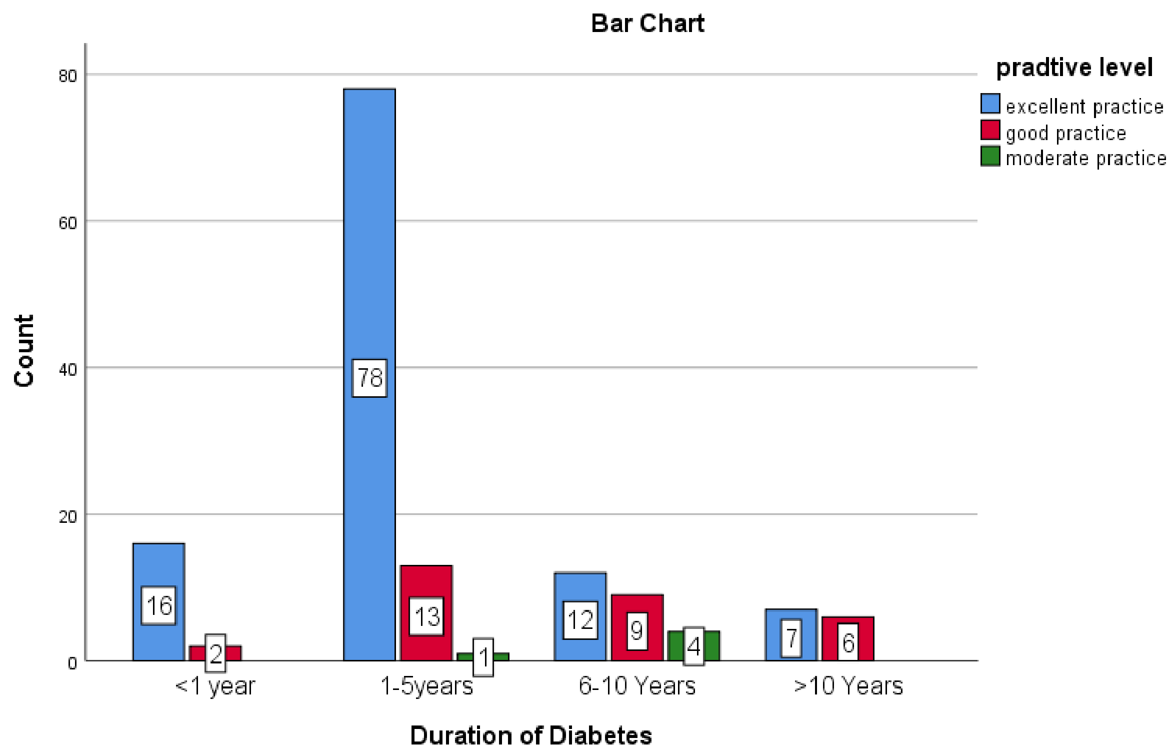
with no formal education show the lowest excellent practice (25%) and the highest good practice (62.5%). Primary education shows moderate excellent practice (60%) with good practice ranging around 33.3%.

Secondary education has very high excellent practice (86.7%) and very low moderate practice (4.4%). Graduates also show a high excellent practice level (85.1%), with no moderate practice (0%). Postgraduates show excellent practice at 77.8%, with good practice at 22.2%. Overall, excellent practice ranges from 25% to 86.7%, good practice ranges from 8.9% to 62.5%, and moderate practice remains very low, ranging only 0% to 12.5%. The chi-square test ($\chi^2 = 23.339$, $p = 0.003$) indicates that there is a significant association between educational status and practice level, meaning higher education is linked with higher levels of excellent practice.

Table 37: Distribution of practice level according to duration of diabetes

	Practice level			
Duration of Diabetes	excellent practice	good practice	moderate practice	Total
<1 year	16	2	0	18
	88.90%	11.10%	0.00%	100.00%
1-5years	78	13	1	92
	84.80%	14.10%	1.10%	100.00%
6-10 Years	12	9	4	25
	48.00%	36.00%	16.00%	100.00%
>10 Years	7	6	0	13
	53.80%	46.20%	0.00%	100.00%
Total	113	30	5	148
	76.40%	20.30%	3.40%	100.00%

Figure 37: Bar graph shows practice level by duration of diabetes



The table shows a clear pattern between duration of diabetes and practice level, with most participants showing excellent practice, but the percentages vary widely across different duration groups. Those with <1 year of diabetes had the highest excellent practice (88.9%), with good practice at 11.1% and no moderate practice (0%Participants with 1–5 years also showed very high excellent practice (84.8%) with good practice ranging at 14.1% and moderate practice very low (1.1%).

For 6–10 years, excellent practice decreased to 48%, while good practice increased to 36%, and moderate pact participants with >10 years showed 53.8% excellent practice and 46.2% good practice, with no moderate practice (0%).Overall, excellent practice ranges widely from 48% to 88.9%, good practice ranges between 11.1% and 46.2%, and moderate practice remains low, between 0% and 16%' The chi-square value (χ^2 = 28.791, p = 0.000) indicates a significant association between duration of diabetes and practice level. This means practice pattern changes with time, with excellent practice highest in early years and more variation appearing after longer dis

DISCUSSION

The present study was conducted to assess the knowledge, attitude, and practices related to diabetic-friendly packaged foods among diabetic patients and to examine their association with selected socio-demographic variables such as age, gender, educational status, and duration of diabetes. The findings provide valuable insights into patients' awareness, perceptions, and actual dietary behaviours regarding commercially available diabetic-friendly packaged foods.

Demographic Profile of the Respondents

The study population primarily consisted of middle-aged individuals, indicating that diabetes was most prevalent during this stage of life. This observation is consistent with existing evidence that type 2 diabetes commonly develops in middle adulthood due to lifestyle transitions, reduced physical activity, and metabolic changes. Younger adults constituted a considerable proportion of the respondents, while older individuals formed a relatively smaller group.

A slightly higher representation of females was observed compared to males. This may be attributed to greater health-seeking behaviour among women or increased availability at the time of data collection. Occupational distribution showed that a large segment of respondents were housewives, followed by individuals engaged in business activities, suggesting representation from both economically active and non-working populations.

Most participants had attained at least a secondary level of education, with a substantial proportion having completed higher education. This relatively good educational background is important, as education is known to influence health awareness, interpretation of food labels, and informed dietary choices. With respect to disease characteristics, the majority of participants were in the early or intermediate stages of diabetes, while only a small proportion had been living with the disease for a longer duration. This indicates that most respondents were relatively recent diagnoses who may have received recent dietary counselling.

Knowledge Regarding Diabetic-Friendly Packaged Foods

The findings revealed a generally high level of awareness regarding diabetic-friendly packaged foods. Most respondents were familiar with the concept and could correctly identify certain products such as high-fibre snacks and sugar-free items as suitable options for diabetic individuals. A large proportion also reported knowing how to read nutrition labels, reflecting a satisfactory level of nutrition literacy.

Despite this overall awareness, notable knowledge gaps were identified. A considerable number of respondents were uncertain about the safe consumption of sugar-free products, while some believed that these foods could be consumed without restriction. Such misconceptions may lead to excessive intake and poor glycemic control. Although many participants recognized carbohydrates as a key nutrient to monitor, others focused primarily on protein or fibre, indicating partial understanding of nutrient balance in diabetes management.

Statistical analysis revealed that knowledge levels varied significantly with age, educational status, and duration of diabetes. Younger individuals and those with higher education demonstrated better knowledge, possibly due to greater exposure to health information and better comprehension skills. Patients with a shorter duration of diabetes also showed higher awareness, likely reflecting recent exposure to diabetes education following diagnosis. In contrast, knowledge levels did not differ meaningfully between males and females, suggesting comparable awareness across genders.

Attitude Towards Diabetic-Friendly Packaged Foods

Attitude assessment indicated a moderately positive outlook toward diabetic-friendly packaged foods among most respondents. Many participants expressed trust in product labelling; however, a parallel sense of doubt regarding the accuracy and reliability of such labels was also evident. This reflects a cautious attitude rather than complete acceptance.

Uncertainty regarding the role of these foods in diabetes management was apparent, as a substantial proportion of respondents neither strongly agreed nor strongly disagreed about their benefits. A clear preference for home-cooked meals was observed, highlighting the cultural importance of traditional diets and a reluctance to rely heavily on packaged foods.

Concerns about the safety of artificial sweeteners were widespread, indicating apprehension about long-term health effects. Additionally, most respondents reported that healthcare professionals did not actively encourage the consumption of diabetic-friendly packaged foods. The absence of professional endorsement may have contributed to hesitation and mixed attitudes.

Educational status showed a strong association with attitude, emphasizing the role of education in shaping perceptions and confidence in food choices. Other demographic variables, such as age, gender, and duration of diabetes, did not significantly influence attitude, suggesting that beliefs are more strongly guided by knowledge sources and professional advice.

Practices Related to Diabetic-Friendly Packaged Foods

In contrast to relatively favourable knowledge and attitudes, actual practices were more restrained. Many respondents reported purchasing diabetic-friendly packaged foods occasionally, while consistent or routine use was uncommon. Encouragingly, label-reading behaviour was widely practiced, indicating that awareness was translated into cautious food selection.

Consumption of sugar-free snacks and use of sugar substitutes were generally occasional rather than frequent, reflecting a careful and moderated approach. Portion control practices were notably strong, with most respondents consistently monitoring serving sizes, which is a positive behaviour in diabetes management.

Consultation with healthcare professionals prior to using diabetic-friendly packaged foods was limited. Furthermore, most respondents did not replace regular meals with packaged alternatives, reinforcing the continued reliance on traditional, home-prepared foods.

Practice levels were significantly influenced by age, educational status, and duration of diabetes. Younger individuals, those with higher education, and patients with a shorter duration of the disease demonstrated better dietary practices. Similar to knowledge and attitude, gender did not play a significant role in influencing practices.

CONCLUSION

The present study was conducted to assess the knowledge, attitude, and practices regarding diabetic-friendly packaged foods among diabetic patients and to examine their association with selected socio-demographic and clinical variables. The findings of the study provide valuable insights into consumer awareness, perceptions, and usage patterns of diabetic-friendly packaged foods. The study revealed that the majority of respondents had adequate awareness of diabetic-friendly packaged foods and demonstrated good knowledge regarding nutrition label reading, portion size importance, and carbohydrate monitoring.

However, certain misconceptions were identified, particularly regarding the unlimited safety of sugar-free foods and the actual health benefits of diabetic-friendly packaged products Although most respondents exhibited a moderately positive attitude, there was noticeable scepticism related to food labelling claims and concerns regarding the safety of artificial sweeteners. A strong preference for traditional home-cooked foods was evident, and reliance on diabetic-friendly packaged foods for regular dietary management was low. Limited encouragement from healthcare professionals further influenced cautious attitudes toward these products. In terms of practices, respondents demonstrated selective and cautious usage of diabetic-friendly packaged foods.

While label reading and portion control practices were commendable, frequent consumption and meal replacement with packaged foods were uncommon. Consultation with doctors or dietitians before using these products was also limited. Statistically significant associations were observed between educational status, age, and duration of diabetes with knowledge and practice levels, highlighting the role of education and disease experience in influencing dietary behaviour.

Gender did not significantly affect knowledge, attitude, or practice. In conclusion, the study indicates a knowledge–practice gap, where awareness does not always translate into consistent dietary behaviour. The findings emphasize the need for structured nutrition education, clear and transparent food labelling, and greater involvement of healthcare professionals in guiding diabetic patients regarding the appropriate use of diabetic-friendly packaged foods. Strengthening these aspects may contribute to improved dietary choices and better diabetes management.

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ANNEXURES

Questionnaire

‘ST. ANN’S COLLEGE FOR WOMEN

Autonomous, affiliated to Osmania University, NAAC Accredited with

‘A’ Grade (4th Cycle), CPE by UGC, ISO 9001:2015 ISO 14001:2015

Mehdipatnam, Hyderabad- 500028

Topic: Assessment of Knowledge, Attitude, and Practice (KAP) on Diabetic-Friendly Packaged Foods among Type 2Diabetes Patients in Hyderabad”

Section A: Demographic Information

1. Age: ___ years___

2. Gender: ☐ Male ☐ Female ☐ Other

3. Educational Status:

o ☐ No formal education

o ☐ Primary

o ☐ Secondary

o ☐ Graduate

o ☐ Postgraduate and above

4. Occupation: ____________________

5. Duration of Diabetes:

o ☐ < 1 year

o ☐ 1–5 years

o ☐ 6–10 years

o ☐ > 10 years

6. Current treatment for diabetes:

o ☐ Diet only

o ☐ Oral medication

o ☐ Insulin

o ☐ Combination therapy

Section B: Knowledge

(Yes/No/Don't know or Multiple Choice)

1. Have you heard of diabetic-friendly packaged foods? (Yes/No)

2. Which of the following do you think are diabetic-friendly packaged foods?

o ☐ Sugar-free biscuits

o ☐ Sugar substitutes

o ☐ High-fiber snacks

o ☐ Regular soft drinks

o ☐ Diet namkeens

3. Do you know how to read nutrition labels on packaged foods?

(Yes/No)

4. Do you believe "sugar-free" means safe for unlimited consumption?

(Yes/No/Don't know)

5. Which nutrient is most important to check in packaged foods for diabetes

management?

o ☐ Carbohydrates

o ☐ Protein

o ☐ Fats

o ☐ Fiber

o ☐ Not sure

6. Are you aware of artificial sweeteners used in packaged foods?

(Yes/No)

7. Do you think all "diabetic-friendly" foods are truly safe for diabetics?

(Yes/No/Not sure)

on C: Attitude

(Likert scale: Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree)

1. I trust the labelling of "diabetic-friendly" packaged foods.

(Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree)

2. I believe these foods help in better diabetes management.

(Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree)

3. What challenges do you face in using diabetic-friendly packaged foods?

☐ Cost

☐ Taste

☐ Availability

☐ Lack of trust in labelling

☐ Others: ___________

4. I feel confident that these products are safe for regular consumption by diabetic patients.

(Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree)

5. I prefer packaged diabetic-friendly foods over traditional home-cooked foods.

(Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree)

I think consuming these foods regularly can reduce my dependency on medicines.

(Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree)

7. I am concerned about the safety of artificial sweeteners in these foods.

(Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree)

8. My doctor/dietitian encourages me to consume diabetic-friendly packaged foods.

(Strongly Agree / Agree / Neutral / Disagree / Strongly Disagree)

Section D: Practice

(Frequency-based: Always / Often / Sometimes / Rarely / Never)

1. How often do you purchase diabetic-friendly packaged foods?

(Always / Often / Sometimes / Rarely / Never)

2. Do you read the nutrition label before buying packaged foods?

(Always / Often / Sometimes / Rarely / Never)

3. How frequently do you consume sugar-free biscuits/snacks?

(Always / Often / Sometimes / Rarely / Never)

4. Do you use sugar substitutes in your daily diet?

(Always / Often / Sometimes / Rarely / Never)

5. How often do you check portion size while consuming these foods?

(Always / Often / Sometimes / Rarely / Never)

6. Do you consult your doctor/dietitian before using diabetic-friendly packaged foods?

(Always / Often / Sometimes / Rarely / Never)

7. Have you ever replaced a meal with packaged diabetic-friendly foods?

(Always / Often / Sometimes / Rarely / Never)

8. How often do you recommend these foods to other diabetic patients?

(Always / Often / Sometimes / Rarely / Never