

Received Date: February 25, 2024

Accepted Date: March 12, 2024

Published Date: April 17, 2024

Eating Habits and Anthropometric Characteristics Among Individuals with Type 2 Diabetes Mellitus A review

Suheir Abdul Mohsen Al-Gaedan ¹, Nadhrh Abdullah Al Qatari ², Ahmed Ibrahim Alhashim ³, Mohammed Hussain Alhassan ⁴, Ahmad Hassan Almutawah ⁴, Amirah Waleed Alessa ⁵, Abdullah Salman Alsaleh ⁶, AbdulWahab Sultan AlSultan ⁷, Adnan Jafar Alkathim ⁷, Anwar Mohammad Alhamdan ⁷, Jumanah Ali Alsultan ⁸, Mustafa Abdulmohsen Alshareet ⁹, Hawra Abdullah Ahmed Alabuabdullah ¹⁰

1. Mental Health Hospital in Alahsa
2. Technical lab, Maternity and Children Hospital Al Dammam
3. Nutrition technician, Maternity and children hospital- Dammam
4. Administration of Medical Transport, Alahsa Health Cluster
5. Psychiatric Hospital
6. Oyun city hospital
7. Prince Saud Bin Jalawy Hospital
8. Al Twaitheer primary health care
9. Medical Transportation Department
10. Maternity And Children Hospital

Abstract

Type 2 Diabetes Mellitus (T2DM) is a global epidemic intrinsically linked to modifiable lifestyle factors. Eating habits and specific anthropometric profiles are central to both the etiology and management of the disease. Understanding their interrelationship is crucial for effective prevention and

treatment strategies. This narrative review synthesizes current evidence on the distinctive eating patterns and anthropometric characteristics observed in individuals with T2DM, exploring their bidirectional relationship and clinical implications.

A synthesis of contemporary literature and key guidelines from sources such as the American Diabetes Association (ADA), World Health Organization (WHO), and peer-

reviewed journals was conducted, focusing on reviews and meta-analyses from the past decade.

Key Findings: Individuals with T2DM consistently exhibit anthropometric profiles marked by central adiposity, reflected in elevated waist circumference and high waist-to-hip ratios, even when BMI falls within the normal range. Eating habits are frequently characterized by high intake of refined carbohydrates, added sugars, and saturated fats, alongside low fiber consumption. Mediterranean and DASH dietary patterns are associated with improved glycemic control and favorable anthropometric changes. A strong bidirectional relationship exists where poor dietary choices drive adverse changes in body composition (particularly increased visceral fat), which in turn exacerbates insulin resistance and influences dietary behaviors and energy metabolism. The synergy between dysregulated eating habits and adverse anthropometry forms a core pathophysiological axis in T2DM. Effective management necessitates integrated interventions that simultaneously target diet quality and body composition, with a particular emphasis on reducing central obesity. Future research should prioritize personalized nutrition approaches based on individual anthropometric and metabolic phenotypes.

Keywords: Type 2 Diabetes, Eating Habits, Dietary Patterns, Anthropometry, Waist Circumference, Obesity, Insulin Resistance.

1. Introduction

Type 2 Diabetes Mellitus (T2DM) represents a complex metabolic disorder defined by chronic hyperglycemia resulting from a combination of insulin resistance and progressive pancreatic beta-cell dysfunction. While genetic predisposition plays a role, the condition is largely driven by environmental and lifestyle factors. Among these, eating habits and resulting anthropometric characteristics—the measurable physical dimensions and composition of the body—are paramount. This review examines the specific eating behaviors and anthropometric profiles prevalent in individuals with T2DM, details their mechanistic interplay, and discusses the implications for clinical management and public health strategies.

2. Anthropometric Characteristics in T2DM

Anthropometry provides critical, low-cost indicators of metabolic health beyond simple weight measurement.

2.1. Key Indicators and Their Significance

- **Body Mass Index (BMI):** While a high BMI (≥ 25 kg/m²) is a major risk factor for T2DM, its limitation

lies in not distinguishing fat from muscle or fat distribution. A significant proportion of individuals with T2DM have a BMI in the overweight or obese range at diagnosis.

- **Waist Circumference (WC) and Waist-to-Hip Ratio (WHR):** These are superior predictors of T2DM risk and cardiovascular complications than BMI alone. They are direct proxies for visceral adipose tissue (VAT), which is highly metabolically active, releasing pro-inflammatory adipokines and free fatty acids that directly promote insulin resistance in the liver and skeletal muscle.
- **Body Composition:** Individuals with T2DM often have a phenotype characterized by:
 - **High Visceral Fat:** Even in those with normal BMI ("metabolically obese normal weight").
 - **Ectopic Fat Deposition:** Accumulation of fat in liver, pancreas, and muscle.
 - **Sarcopenia:** Age-related loss of muscle mass and strength, which can be accelerated in T2DM ("sarcopenic obesity"). Low muscle mass reduces the body's primary site for glucose disposal.

2.2. Clinical Trajectory

Anthropometry often changes with disease progression: unexplained weight loss may occur pre-diagnosis due to osmotic diuresis; insulin therapy can promote weight gain; and significant weight loss through intensive lifestyle intervention or bariatric surgery can induce diabetes remission.

3. Eating Habits in T2DM

Dietary patterns significantly influence both the development and management of T2DM.

3.1. Common Dietary Patterns

- **Detrimental Patterns:** The "Western" dietary pattern—high in processed meats, refined grains, sugar-sweetened beverages, and ultra-processed foods—is consistently associated with increased T2DM incidence and poorer glycemic control.
- **Beneficial Patterns:**
 - **Mediterranean Diet:** Emphasizes fruits, vegetables, whole grains, legumes, nuts, olive oil, and fish. Linked to improved HbA1c, reduced cardiovascular risk, and favorable changes in body composition.
 - **DASH (Dietary Approaches to Stop Hypertension) Diet:** Similar benefits, focusing on

nutrient-dense foods and limiting sodium and saturated fat.

- **Plant-Based Diets:** High in fiber and phytonutrients, associated with improved insulin sensitivity and lower BMI.
- **Structured Low-Carbohydrate Diets:** Can be effective for short-term glycemic improvement and weight loss, though long-term adherence and effects on lipid profiles require individual monitoring.

3.2. Specific Nutritional Components

- **Carbohydrate Quality:** Low glycemic index (GI) and high-fiber carbohydrates lead to slower glucose absorption and lower postprandial spikes.
- **Dietary Fiber:** Particularly soluble fiber (e.g., from oats, legumes, apples) improves glycemia and lipid profiles.
- **Fat Quality:** Replacing saturated and trans fats with monounsaturated and polyunsaturated fats (e.g., from olive oil, nuts, fatty fish) improves lipid metabolism and insulin sensitivity.

3.3. Meal Timing and Frequency

Irregular meal patterns and frequent snacking, especially on high-GI foods, can destabilize glycemic control. Emerging evidence suggests that time-restricted eating (e.g., confining eating to an 8–12-hour window) may improve insulin sensitivity and aid weight management.

4. The Bidirectional Interaction

The relationship between diet and anthropometry in T2DM is cyclical and self-reinforcing:

1. **Diet → Anthropometry → Pathophysiology:** Excessive caloric intake, particularly from unhealthy foods, promotes weight gain and visceral fat accumulation. This adipose tissue dysfunction drives systemic inflammation and insulin resistance, leading to T2DM.
2. **Pathophysiology → Altered Physiology & Behavior:** Insulin resistance and hyperinsulinemia can promote further weight gain and increase hunger signals. The diagnosis of T2DM or the presence of diabetes-related distress can also lead to emotional eating or restrictive dieting cycles.
3. **Anthropometry → Metabolic Rate → Diet:** Body composition affects basal metabolic rate. Loss of muscle mass (sarcopenia) lowers energy

expenditure, which can make weight management more challenging if dietary intake is not adjusted.

5. Clinical and Public Health Implications

5.1. Assessment

- **Anthropometry:** Clinical assessment must move beyond BMI to include waist circumference and, where possible, body composition analysis.
- **Dietary Assessment:** Should evaluate not just calorie intake, but dietary pattern, meal timing, carbohydrate quality, and psychosocial factors affecting food choices.

5.2. Intervention

- **Integrated Lifestyle Programs:** The most effective interventions combine personalized medical nutrition therapy with structured physical activity (including aerobic and resistance training) to improve both diet quality and body composition.
- **Focus on Central Adiposity:** Interventions should explicitly target reduction in waist circumference as a key metric of success.
- **Behavioral Support:** Long-term adherence requires addressing behavioral skills, motivation, and environmental barriers.

6. Gaps and Future Directions

Research needs include:

- Defining optimal dietary patterns for different T2DM sub-types (e.g., lean vs. obese T2DM).
- Long-term outcomes of popular dietary strategies (e.g., intermittent fasting, very-low-carb diets).
- The role of the gut microbiome in mediating the diet-anthropometry-T2DM relationship.
- Development of more effective, scalable models for sustaining lifestyle change.

7. Conclusion

Eating habits and anthropometric characteristics are deeply intertwined pillars in the foundation of T2DM pathophysiology and management. Central adiposity, rather than weight alone, and the quality of the dietary pattern, rather than single nutrients, are critical foci. Breaking the cycle of poor nutrition and adverse body composition requires consistent, personalized, and supported lifestyle intervention as a cornerstone of diabetes care.

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