

Nutrition in Physical Therapy Practice

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ABSTRACT

This monograph explores the vital intersection of nutrition and physical therapy, emphasizing nutrition's essential role in optimizing patient outcomes. It explains how nutrition influences musculoskeletal health and affects the body's ability to recover from injuries, manage chronic conditions, and prevent future health issues. This monograph also highlights the complex challenges that physical therapists encounter when recommending nutritional interventions. These challenges include navigating the scope of practice boundaries, time constraints, and the need for ongoing professional development to stay abreast of evolving nutritional science. While challenges exist, the potential benefits of incorporating nutrition into physical therapy practice are substantial. By embracing their role as educators, coaches, and wellness promoters, physical therapists can contribute to a more comprehensive and patient-centered approach to healthcare, ultimately leading to improved patient well-being. Case Analyses: Four unique case studies are presented. Each case highlights the strong clinical relationship between nutrition and physical therapy. The first case involves a 62-year-old female who was a former marathoner diagnosed with osteoporosis. The second case study examines a 47-year-old female seeking relief from pain, fatigue, and digestive issues. The third case study details how nutritional coaching assisted a 61-year-old male in weight management and making changes in his joint pain. The last case study discusses the journey of a 45-year-old male seeking a holistic approach to eczema relief, weight loss, and digestive distress.

Key Words: diet, nutrition, physical therapy

LEARNING OBJECTIVES

Upon completion of this monograph, the course participant will be able to:

1. Understand the current state of nutrition in the United States.
2. Acknowledge the role of the food we consume in accelerating disease and dysfunction in our patient population.
3. Recognize how current agricultural practices contribute to escalating health issues among our patients.
4. Understand the pathophysiology of nutrition in chronic degenerative diseases commonly encountered in physical therapy.

5. Understand how chronic degenerative disease, obesity, and nutrient deficiencies impact our patients' healing potential, injury prevention, and overall health and wellness.
6. Compare and contrast various diets that patients may adopt, outlining the advantages and disadvantages of each dietary approach.
7. Understand the physical therapist's role in educating and coaching our patients and promoting wellness.
8. Discuss the limits and challenges physical therapists face when recommending nutritional interventions.

INTRODUCTION

In the realm of healthcare, the role of nutrition has emerged as a critical determinant of overall well-being and therapeutic success. Physical therapists, as key members of the healthcare team, recognize nutrition's impact on their patients' rehabilitation and recovery processes. Nutrition has many different functions within the body. It is not just fuel for energy but also provides our body with information. This information dictates cellular activity, metabolism, immune function, and tissue repair and directs the function of our genes.¹ The information from food can influence our genes to turn on or off, which can affect the development of disease. Consuming foods that provide the wrong information to our body can cause obesity, undernourishment, poor health, and place a person at risk of developing disease. All the macronutrients, as well as vitamins and minerals, are essential for proper function in the body. Carbohydrates provide energy to the body, proteins support growth and repair, fats play a crucial role in maintaining healthy cell membranes and aiding in vitamin absorption and hormone production, while vitamins and minerals act as catalysts for various chemical processes.

As physical therapists focused on restoring function, it's imperative that we comprehend the impact of our patients' diets on the healing process. This knowledge empowers us to identify opportunities for enhancing dietary choices, ultimately aiding patients in their journey back to full function.

UNDERSTANDING THE CURRENT STATE OF NUTRITION IN AMERICA

The prevailing nutritional situation in the United States poses significant health concerns for the general population and our patients undergoing physical therapy. Despite having access to a wide variety of food options, many of our patients are not eating foods that promote health and wellness and are consuming foods that can lead to dysfunction and disease.² A quote attributed to nutrition and lifestyle coach Heather Morgan³ sums this situation up perfectly: "Every time you eat or drink, you are either feeding disease or fighting it."

Over the past two decades, research on nutrition's impact on health has consistently shown that the food we consume directly influences our energy levels, affecting our vitality and ability to carry out daily activities. Additionally, nutrition plays a significant role in determining our physical and mental performance and our ability to excel in tasks and activities, both physically and cognitively. This underscores the importance of diet in overall well-being.⁴⁻⁷

Many researchers believe that the decline in Americans' physical and mental health is directly related to dietary habits, such as an increased consumption of processed foods and an insufficient intake of vegetables, fruits, nuts, seeds, whole grains, lean proteins, and omega-3 fats. The 2020-2025 Dietary Guidelines for Americans report found that only 5%

of American adults meet the recommended intake for all five food groups, and over 80% need to eat more fruits, vegetables, or whole grains.⁸ The lack of sufficient nutrition has significant public health implications and plays a role in many nutrition-related health conditions prevalent in patients presenting to physical therapy (**Table 1**).

Table 1. Facts about Nutrition-Related Health Conditions in the United States

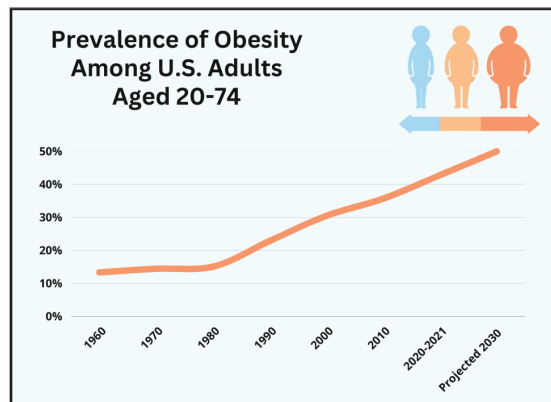
Health Condition	Current Facts And Statistics
Overweight and Obesity	<ul style="list-style-type: none"> • About 74% of adults are overweight or have obesity; 41.9% are obese • Nearly 20% of children and adolescents are obese and an additional 16% are overweight • Black adults have the highest level of adult obesity at 49.9% • Hispanic adults have an obesity rate of 45.6% • Rural parts of the country have higher rates of obesity than urban and suburban areas • Currently 19 states have obesity rates over 35%; a decade ago, no state had an obesity rate at or above 35%
Cardiovascular Disease and Risk Factors (Coronary artery disease, stroke, hypertension, high cholesterol)	<ul style="list-style-type: none"> • Cardiovascular disease is the leading cause of death in the United States; stroke is the 5th leading cause of death • Over 120 million U.S. adults aged 20 and older have cardiovascular disease • Nearly half of the adults in the United States have hypertension (systolic blood pressure > 130 mmHg or diastolic blood pressure > 80 mmHg or are taking medication for hypertension) • About 86 million U.S. adults aged 20 or older have total cholesterol levels > 200 mg/dL and nearly 25 million adults have total cholesterol levels > 240 mg/dL
Type 2 Diabetes	<ul style="list-style-type: none"> • 34.2 million people (10.5% of the population) have diabetes, the majority of cases being type 2 • The highest rate of diabetes is among American Indians/Alaskan Natives (14.5%), black adults (12.1%), and Hispanics (11.8%) • The prevalence of type 2 diabetes in children has been increasing in recent years due to rising rates of childhood obesity
Metabolic Syndrome	<ul style="list-style-type: none"> • Metabolic syndrome, also known as insulin resistance syndrome, affects over 30% of adults • Metabolic syndrome is caused when at least 3 of these 5 conditions is present: high blood pressure, elevated blood sugar, abdominal obesity, high triglyceride levels, and low high-density lipoprotein cholesterol
Cancer	<ul style="list-style-type: none"> • Cancer is the 2nd leading cause of death in the United States • The most commonly diagnosed cancers among men are prostate, lung, colorectal, and skin cancers • The most commonly diagnosed cancers among women are breast, colorectal, endometrial, lung, cervical, skin, and ovarian cancers
Musculoskeletal Conditions (Osteoporosis, sarcopenia, osteoarthritis)	<ul style="list-style-type: none"> • About 10 million Americans aged 50 and older have osteoporosis • 1:2 women and up to 1:4 men will break a bone in their lifetime due to osteoporosis • For women, the incidence of breaking a bone is greater than that of heart attack, stroke, and breast cancer combined • It is estimated that 10-30% of older adults in the United States have sarcopenia, loss of muscle mass • Strength loss, which occurs 2-5 times faster than muscle mass loss, consistently increases the risk of disability and death • An estimated 32.5 million adults, about 13.2% of the adult population, suffer from osteoarthritis, with 62% being women • One third of people with osteoarthritis have 5 or more chronic conditions

As physical therapists, we must be highly attuned to our patients' diets and clearly understand how their daily food intake directly affects their general health and the outcomes of their treatments. Currently, many of our physical therapy patients are facing a range of substantial health challenges:

- The United States currently ranks 34th in the world in life expectancy,⁹ yet spends the most money of any country on health care.
- An estimated 60% of American adults have at least one chronic health condition, and 42% have multiple chronic conditions.¹⁰
- Obesity prevalence in the United States has tripled over the last 60 years, increasing from roughly 13% in the 1960s to 30.9% in 2000 and, as of 2018, 42.8 % of American adults are obese.¹¹
- Cancer is the second leading cause of death in the United States, with 1 in every 3 people getting cancer in their lifetime.¹²
- Over the last 25 years, there has been a 50% increase in autoimmune diseases such as lupus, type 1 diabetes, rheumatoid arthritis, inflammatory bowel disease, and multiple sclerosis.¹³
- As of 2022, 1 in 5 Americans struggle with mental health issues on a daily basis.¹⁴

The prevalence of obese and overweight Americans has risen dramatically in recent decades (**Figure 1**). The most common health consequences of being overweight or obese include increasing the risk of cardiovascular disease, diabetes, kidney disease, musculoskeletal disorders like osteoarthritis, and several cancers, including endometrial, breast, ovarian, prostate, liver, gallbladder, kidney, and colon.^{15,16}

Figure 1. Prevalence of Obesity Among United States Adults Aged 20-74^{30,1}



Date gathered from the National Health and Nutrition Examination Survey (NHANES)

Impact of Obesity on Health and Disease

Obesity increases the risk of disease in several ways. Adipose tissue (fat) produces inflammatory molecules, such as cytokines, that can disrupt normal metabolic processes and promote inflammation.¹⁷ Chronic inflammation is linked to an increased risk of cardiovascular disease, type 2 diabetes, certain cancers, and other chronic conditions.¹⁸ Obesity is closely related to insulin resistance, a condition in which the body's cells become less responsive to the effects of insulin. This can lead to elevated blood sugar levels and, over time, the development of type 2 diabetes.¹⁹ Insulin resistance is also associated with an increased risk of cardiovascular disease.²⁰ Obesity often contributes to dyslipidemia, which involves abnormal levels of lipids (cholesterol and triglycerides) in the blood. Dyslipidemia tends to be characterized by high levels of triglycerides, low levels of high-density lipoprotein (HDL) cholesterol (the "good" cholesterol), and an increased number of small, dense, low-density lipoprotein (LDL) particles. Dyslipidemia is a significant risk factor for cardiovascular disease. Excess body weight and obesity can lead to hypertension (HTN).²¹ The additional fat tissue requires more blood supply, which can strain the circulatory system and raise blood pressure.

Hypertension is a significant risk factor for heart disease, stroke, and other cardiovascular conditions, such as heart failure, peripheral artery disease, aortic aneurysm, kidney disease, arrhythmias, hypertensive retinopathy, pulmonary HTN, and cognitive impairment.²² Metabolic syndrome, a cluster of conditions that include abdominal obesity, HTN, high blood sugar, abnormal lipid levels, and insulin resistance, significantly increases the risk of cardiovascular disease²³ and type 2 diabetes.²⁴ In addition, metabolic syndrome can also raise the risk of other health conditions such as non-alcoholic fatty liver disease,²⁵ polycystic ovary syndrome,²⁶ chronic kidney disease,²⁷ gout,²⁸ cognitive decline and Alzheimer disease,²⁹ and certain cancers.³⁰ The excess weight associated with obesity also places mechanical stress on the joints, particularly in weight-bearing areas such as the knees and hips. This can contribute to the development or worsening of conditions such as osteoarthritis.^{31,32} Obesity is a known risk factor for various types of cancer, including breast, colorectal, endometrial, kidney, pancreatic, and esophageal cancers.^{33,34} The exact mechanisms are not fully understood, but obesity may contribute to cancer development through hormonal imbalances,³⁵ chronic inflammation,³⁶ and altered immune responses.^{37,38}

Impact of Nutrition on Cardiovascular Disease

The impact of nutrition on cardiovascular disease (CVD) is significant and multifaceted. Poor dietary choices, such as excessive intake of saturated and trans fats, refined sugars, and sodium, can contribute to the development and progression of CVD risk factors. In 2012, in a study examining the relationship between nutrition and deaths related to heart disease, cerebral vascular accident, and diabetes mellitus type 2, nearly half of all deaths within the United States related to cardiometabolic disease were associated with suboptimal dietary habits.³⁹ Additionally, the most frequently estimated diet-related cardiometabolic deaths were related to high sodium (9.5%), low nuts or seeds (8.5%), high processed meats (8.2%), low seafood

omega-3 fats (7.8%), low vegetables (7.6%), low fruits (7.5%), and high consumption of sugar-sweetened beverages (7.4%).³⁹

Impact of Nutrition on Diabetes Risk

Poor nutrition is a major risk factor for developing diabetes.⁴⁰ Excessive calorie intake can lead to weight gain and obesity, a significant risk factor for type 2 diabetes.⁴¹ Diets high in added sugars, unhealthy fats (saturated and trans fats), and refined carbohydrates can result in insulin resistance and impaired glucose control, increasing the risk of developing type 2 diabetes.^{42,43} Overconsumption of sugar-sweetened beverages, such as sodas, fruit juices, and energy drinks, has been associated with an increased risk of type 2 diabetes.^{44,45} These beverages have been reported to be associated with weight gain, insulin resistance, and higher blood sugar levels. Additionally, inadequate intake of dietary fiber, found in fruits, vegetables, whole grains, legumes, and nuts, has been associated with an increased risk of type 2 diabetes.⁴⁶ Fiber helps regulate blood sugar levels, improves insulin sensitivity, and promotes satiety, reducing the risk of diabetes.

Impact of Nutrition on Cancer Risk

In 2015, more than 80,000 new cancer cases in U.S. adults were estimated to be associated with a suboptimal diet.⁴⁷ While nutrition alone does not cause cancer, it can influence various factors that play a role in cancer development and progression.⁴⁸ Obesity is a known risk factor for several types of cancer, including breast, colorectal, endometrial, kidney, pancreatic, and esophageal.³³ Excess body weight can also promote chronic inflammation, insulin resistance, and hormonal imbalances, which can contribute to cancer development.⁴⁹

Specific dietary components have been linked to an increased risk of cancer. For example, high red meat intake has been positively associated with the risk of breast, endometrial, colorectal, lung, and liver cancers, and high processed meat intake was positively related to the risk of breast, colorectal, colon, rectal, and lung cancers.⁵⁰ A high-sodium diet has also been linked to an increased risk of stomach cancer⁵¹ and excessive alcohol consumption is a risk factor for various cancers, including those of the mouth, throat, esophagus, stomach, colorectal, central nervous system, pancreas, breast, and prostate.⁵² Insufficient intake of fruits and vegetables that are rich in vitamins, minerals, fiber, and antioxidants is associated with a higher risk of several types of cancer, including lung, stomach, colorectal, and breast.^{51,53–55} Furthermore, fruit and vegetable consumption reduces cancer risk, cardiovascular disease, and all-cause mortality.⁵⁶ These plant-based foods contain numerous compounds that help protect against cellular damage and inflammation.

Impact of Nutrition on Musculoskeletal Health

Poor nutrition and insufficient nutrient intake can negatively impact musculoskeletal health. Inadequate calcium and vitamin D, essential nutrients for bone health, can increase the risk of developing osteoporosis.^{57,58} Calcium is crucial for bone formation and maintenance, while vitamin D aids calcium absorption. Inadequate levels of these nutrients can lead to reduced bone density and an increased risk of fractures.⁵⁹

Protein is necessary for building and repairing tissues, including muscles, tendons, and ligaments. Inadequate protein intake can impair muscle growth and maintenance, leading to muscle wasting, weakness, and reduced muscle function, increasing the risk of musculoskeletal injuries and impairing overall physical performance.^{60–63} Dietary deficiencies and imbalances have been shown to exacerbate musculoskeletal pain and delay healing of fractures and tissue healing.^{64–66}

Food Insecurity in America

While many Americans enjoy plentiful access to food, the unfortunate reality is that over 44 million Americans, including 13 million children, grapple with food insecurity and a lack of affordable, nutritious food choices.⁶⁷ Food insecurity refers to the lack of consistent access to enough nutritious food for an active and healthy life. Food insecurity denotes the persistent lack of access to sufficient nourishing food for an active and healthy life. According to the U.S. Department of Agriculture (USDA), in 2020, approximately 10.5% of households in the United States experienced food insecurity, which means they faced challenges providing enough food for all household members due to limited resources.⁶⁸ Beyond causing hunger, food insecurity significantly affects overall health and well-being.

Food insecurity and prolonged hunger can lead to inadequate intake of essential nutrients. This can result in malnutrition and deficiencies in vitamins, minerals, protein, and other vital nutrients necessary for normal bodily functions and overall health. Nutritional deficiencies can impair physical and cognitive development, weaken the immune system, and increase susceptibility to infections and diseases.⁶⁹

Insufficient nutrition resulting from food insecurity can harm growth and development, especially in children. A lack of access to an adequate supply of calories and essential nutrients can impede the normal progression of physical growth, hinder proper bone development, and affect cognitive abilities.⁷⁰ Children who experience hunger may encounter challenges such as stunted growth, delayed motor skill development, and difficulties in learning and education. Hunger and malnutrition can further lead to problems in attention, problem-solving, and academic achievement, particularly in children, compounding the impact on their overall well-being and future prospects.⁷¹

Malnutrition resulting from insufficient food intake can weaken the immune system, making individuals more vulnerable to infections and illnesses and delaying disease recovery.⁷² Adequate nutrition is vital for maintaining a robust immune system that can effectively fight off pathogens and support optimal immune response.⁷³

Chronic hunger and poor nutrition increase the risk of developing various chronic diseases. As noted previously, inadequate nutrition can contribute to obesity, metabolic disorders, and imbalances in blood sugar and cholesterol levels, increasing the likelihood of chronic conditions.

Experiencing hunger and food insecurity can have psychological and emotional impacts. It can lead to stress, anxiety, depression, sleep disorders, and feelings of shame, guilt, and low self-esteem.⁷⁴ Prolonged exposure to hunger-related