RJNMSR
Review Journal of Neurological & Medical Sciences Review

Volume 3, Issue 4, 2025

INTEGRATING NUTRITIONAL STRATEGIES INTO PHYSICAL THERAPY PRACTICE: ENHANCING RECOVERY AND OPTIMIZING PATIENT OUTCOMES

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DOI: https://doi.org/10.5281/zenodo.16900145

Received	Accepted	Published
15 May, 2025	23 July, 2025	19 August, 2025

ABSTRACT

Background: *Nutrition plays a vital role in rehabilitation by supporting tissue repair, modulating inflammation, and enhancing functional outcomes. Despite its importance, nutritional guidance is often underutilized in physical therapy (PT) practice due to knowledge gaps and systemic barriers.*

Objectives: *This study aimed to assess the nutritional knowledge of practicing physical therapists, evaluate the frequency of nutritional counseling in clinical settings, and identify perceived barriers to integrating nutrition into rehabilitation care.*

Methods: *A descriptive cross-sectional survey was conducted from January to July 2025 among 120 licensed physical therapists in Lahore, Pakistan. A structured questionnaire and the validated Nutritional Lifestyle Scale (NLS) assessed nutritional knowledge, counseling behaviors, and lifestyle habits. Data were analyzed using SPSS v28 with descriptive statistics, chi-square tests, and Pearson correlation analysis.*

Results: *Most participants were aged 31–40 years, with 50% working in orthopedic rehabilitation. Nutritional knowledge was moderate in 50% of respondents, low in 35%, and high in only 15%. Regarding counseling practices, 33.3% rarely and 25.0% never provided nutritional advice, while only 12.5% reported doing so often or always. Key barriers included lack of knowledge (40%), time constraints (25%), and limited patient interest (15%). A significant positive correlation was found between knowledge scores and counseling frequency ($r = 0.42$, $p < 0.01$), and therapists with healthier personal dietary habits were more likely to counsel patients.*

Conclusions: *There is a notable disconnect between the value of nutrition in rehabilitation and its practical application in PT. Targeted education and interdisciplinary collaboration are essential to bridge this gap and improve patient outcomes through integrated care.*

Keywords: *Physical therapy, nutrition, rehabilitation, counseling, interdisciplinary care, knowledge gap.*

INTRODUCTION

Physical therapy (PT) is a cornerstone in the management and rehabilitation of patients suffering from a wide array of musculoskeletal, neurological, and chronic conditions. Its primary goal is to restore functional ability, reduce pain, and improve overall quality of life. Through targeted exercises, manual therapies, and patient education, physical therapists help patients regain mobility and independence.

However, the success of physical therapy interventions depends not only on the therapeutic techniques employed but also on a variety of intrinsic and extrinsic factors that influence the body's ability to heal and adapt to treatment.[1]

One critical yet often underappreciated factor affecting rehabilitation outcomes is nutrition. Nutrition plays an essential role in the body's recovery processes by providing the necessary substrates for tissue repair, modulating inflammation, and supporting immune function. Optimal nutritional status facilitates muscle synthesis, accelerates wound healing, and helps prevent secondary complications such as muscle wasting and infections. In contrast, malnutrition or poor dietary habits can impede recovery, prolong disability, and increase healthcare costs.[2]

Despite its importance, nutrition is frequently overlooked in physical therapy practice. Many physical therapists do not receive formal training in nutrition and may feel ill-equipped to incorporate nutritional guidance into their treatment plans. This gap represents a missed opportunity, as combining nutritional strategies with physical therapy could significantly enhance patient outcomes and reduce recovery times.[3]

The integration of nutrition and physical therapy is not merely theoretical; emerging evidence underscores the synergistic effects of combining these approaches. For instance, studies have demonstrated that adequate protein intake can improve muscle strength gains in patients undergoing rehabilitation, while omega-3 fatty acids can reduce exercise-induced inflammation and promote tissue healing. Moreover, micronutrients such as vitamin D and calcium are vital for bone health and recovery after fractures or orthopedic surgeries. Hydration status also impacts muscle function and physical performance, making it another key factor to consider during rehabilitation.[4]

The rationale for integrating nutritional strategies into physical therapy is further strengthened by the increasing prevalence of chronic conditions such as obesity, diabetes, and cardiovascular diseases, all of which affect nutritional status and complicate rehabilitation efforts. Addressing nutrition in this context can help manage comorbidities that might otherwise hinder physical therapy progress. Furthermore, as healthcare moves toward more holistic, patient-centered models, interdisciplinary approaches that incorporate nutrition are gaining recognition for their potential to improve long-term outcomes.[5]

Recognizing these factors, this study aims primarily to assess the level of nutritional knowledge among practicing physical therapists and to evaluate the extent to which they currently incorporate nutritional counseling into their clinical practice. By focusing on these two objectives, the study seeks to uncover gaps in knowledge and practice that, if addressed, could improve the integration of nutritional strategies into physical therapy. Understanding therapists' current perspectives and behaviors regarding nutrition will guide the development of targeted education and intervention programs to enhance rehabilitation outcomes through a combined therapeutic and nutritional approach.[6]

Methodology

Study Design and Setting

This study employed a descriptive cross-sectional design to evaluate the integration of nutritional strategies within physical therapy practice. A cross-sectional survey approach was chosen to capture a snapshot of current nutritional knowledge, attitudes, and counseling behaviors among practicing physical therapists. Data collection occurred over a seven-month period, from January to July 2025, across multiple outpatient physical therapy clinics and rehabilitation centers within the metropolitan area of Lahore. These sites were selected to ensure representation from a diverse range of clinical settings, including orthopedic, neurological, and sports rehabilitation specialties.

Participants

The target population consisted of licensed physical therapists actively engaged in clinical practice. Eligibility criteria included a minimum of one year of professional experience post-licensure to ensure familiarity with patient care processes. Physical therapists who had received formal education or certification in nutrition or dietetics were excluded to focus on typical practice patterns without specialized nutritional training.

A convenience sampling method was utilized, inviting therapists through professional networks, clinic administrators, and electronic mailing lists. A total of 150 physical therapists were approached, with 120 completing the survey, yielding an 80% response rate. Participants provided informed consent before participation, and the study protocol was approved by the Institutional Review Board of University of South Asia, Lahore Pakistan.

Data Collection Instruments

Questionnaire Development

A structured questionnaire was developed based on a comprehensive literature review and expert consultation in physical therapy and nutrition. The instrument aimed to assess three domains:

1. **Nutritional Knowledge** – evaluating therapists' understanding of key nutritional concepts relevant to rehabilitation, such as macronutrient roles, micronutrient importance, and hydration.
2. **Counseling Practices** – exploring how frequently and in what manner therapists incorporate nutritional advice into their clinical sessions.
3. **Barriers to Integration** – identifying perceived obstacles that limit the inclusion of nutrition in physical therapy.

The questionnaire contained a mix of closed-ended items (multiple-choice and Likert-scale questions) and open-ended responses for qualitative insights.

Nutritional Lifestyle Scale (NLS)

To further assess personal nutrition behaviors, the validated **Nutritional Lifestyle Scale (NLS)** was incorporated. The NLS is a 20-item scale designed to measure dietary habits, including consumption frequency of fruits, vegetables, proteins, whole grains, and processed foods, as well as hydration practices. Responses on a 5-point Likert scale (from "Never" to "Always") generate a composite score reflecting overall nutritional lifestyle quality. The NLS demonstrated strong internal consistency in previous studies (Cronbach's alpha = 0.85) and was piloted with a small group of therapists for clarity and relevance before full deployment.

Data Collection Procedure

Data collection was systematically conducted over the seven-month study period from January to July 2025. Following ethical approval from the Institutional Review Board of [Institution Name], participants were invited to partake through a combination of professional physical therapy networks, clinic administrators, and targeted electronic mailing lists to ensure broad and representative coverage.

The survey instrument, comprising the structured questionnaire alongside the Nutritional Lifestyle Scale (NLS), was administered electronically via a secure, user-friendly online platform (e.g., Qualtrics or SurveyMonkey). The online format was selected to facilitate convenient, anonymous participation, minimizing respondent burden and enhancing data reliability. Each participant received a unique survey link to prevent duplicate responses and maintain confidentiality.

Before beginning the survey, participants were presented with an informed consent form outlining the study's purpose, voluntary nature, confidentiality safeguards, and approximate time commitment. Only those who provided electronic consent proceeded to complete the questionnaire.

To optimize response rates and data completeness, a multipronged reminder strategy was implemented. After the initial invitation, two follow-up reminder emails were sent at two-week intervals to non-respondents. This approach helped achieve an overall response rate of 80%, which is considered robust for electronic survey methodologies.

Participants typically required approximately 20 minutes to complete the survey, which was designed to balance comprehensiveness with respondent fatigue considerations. The questionnaire incorporated mandatory responses for key items to reduce missing data, while still allowing optional open-ended responses to capture nuanced insights.

All survey responses were securely stored on encrypted servers compliant with data protection regulations. Data were anonymized prior to analysis to ensure participant confidentiality. Throughout the data collection phase, regular data quality checks were conducted to identify incomplete or inconsistent responses, with follow-up clarifications sought when feasible.

Ethical Considerations

Ethical approval was obtained from the Research Ethical Committee of University of South Asia under the Institutional Review Board (IRB), with approval number USA-RW/DR/2023/04/064. All study procedures adhered strictly to ethical guidelines concerning human subjects, including informed consent, confidentiality, and voluntary participation. Participants were assured that their data would be used solely for research purposes and that they could withdraw at any time without repercussions.

Data Analysis

Quantitative data were analyzed using Statistical Package for the Social Sciences (SPSS) version 28. Descriptive statistics (means, standard deviations, frequencies, and percentages) were computed for demographic variables, knowledge scores, counseling practices, and barrier ratings. Chi-square tests examined associations between demographic

characteristics and counseling behaviors. Pearson correlation coefficients assessed relationships between personal nutritional lifestyle scores and professional nutritional knowledge.

Qualitative responses to open-ended questions were thematically analyzed to extract common themes regarding barriers and facilitators to nutritional integration.

Results

Participant Demographics

A total of 120 licensed physical therapists participated in the study, with diverse demographic and professional backgrounds (Table 1). The age of participants ranged from 21 to over 50 years, with the largest proportion (41.7%) falling within the 31–40 age group, followed by 37.5% aged 21–30. The gender distribution showed a moderate male predominance (58.3%), with females accounting for 41.7% of the sample.

Participants also varied in their years of professional experience. Approximately 37.5% reported having 6–10 years of experience, while 33.3% had between 1–5 years, and 29.2% had over 10 years of clinical practice. In terms of specialization, half of the participants (50%) were engaged in orthopedic physical therapy, 25% in neurological rehabilitation, 16.7% in sports rehabilitation, and 8.3% in general rehabilitation practice. These data reflect a heterogeneous sample of physical therapists from multiple rehabilitation disciplines, offering insights into diverse clinical settings.

Table 1: Demographic Characteristics of Participants (N = 120)

Characteristic	Frequency (n)	Percentage (%)
Age (years)		
21-30	45	37.5
31-40	50	41.7
41-50	20	16.7
>50	5	4.1
Gender		
Male	70	58.3
Female	50	41.7
Years of Experience		
1-5 years	40	33.3
6-10 years	45	37.5
>10 years	35	29.2
Area of Specialization		
Orthopedic	60	50.0
Neurological	30	25.0
Sports Rehabilitation	20	16.7
General Rehabilitation	10	8.3

Nutritional Counseling Practices

The frequency with which participants reported providing nutritional counseling during physical therapy sessions varied widely (Table 2). While 29.2% of therapists indicated that they sometimes offered nutritional advice, a significant portion reported rarely (33.3%) or never (25.0%) incorporating any nutrition-related guidance into patient care. Only a small minority—8.3% and 4.2%, respectively—reported doing so often or always.

These results suggest that although many therapists recognize the value of nutritional counseling, a substantial number do not regularly include it in their practice. This inconsistency points toward potential barriers that may prevent the integration of nutrition into standard therapeutic protocols.

Table 2: Frequency of Nutritional Counseling Practices Among Physical Therapists (N = 120)

Nutritional Counseling Frequency	Frequency (n)	Percentage (%)
Never	30	25.0
Rarely	40	33.3
Sometimes	35	29.2
Often	10	8.3
Always	5	4.2

Nutritional Knowledge Levels

Assessment of nutritional knowledge, based on a scoring scale derived from the structured questionnaire, revealed that most participants possessed only moderate knowledge of essential nutritional principles relevant to rehabilitation (Figure 1). Specifically, 50% of respondents scored in the moderate knowledge range (41–70%), while 35% demonstrated low knowledge levels (below 40%). Only 15% of physical therapists achieved a high score (above 70%), indicating a strong grasp of nutrition-related concepts.

This distribution underscores the need for continued professional development and integration of nutrition education within physical therapy curricula and continuing education programs.

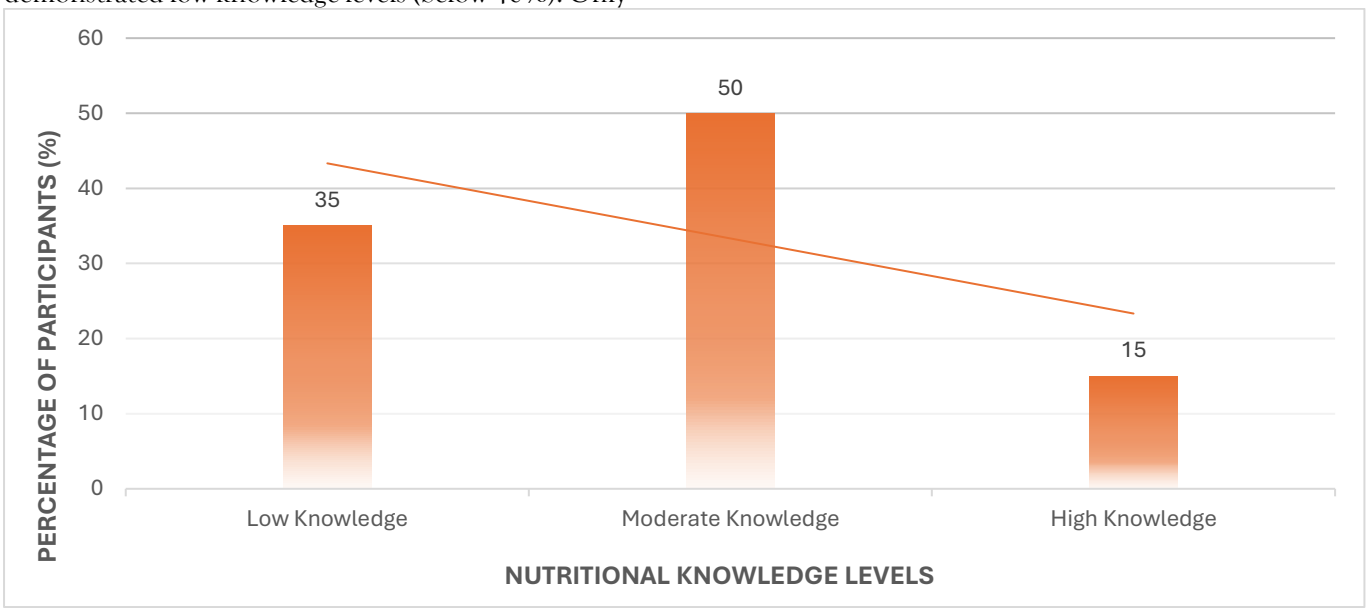

Figure 1: Levels of Nutritional Knowledge Among Physical Therapists

Barriers to Nutritional Integration

Participants were also asked to identify perceived barriers to incorporating nutrition into physical therapy practice. Responses were categorized into five major themes, which are presented in Figure 2.

The most frequently cited barrier was a **lack of nutritional knowledge** (40%), reinforcing earlier findings on knowledge levels. **Time constraints** during clinical sessions were the second most reported issue (25%), followed by **limited patient interest or compliance** (15%). Other barriers included a **lack of interdisciplinary collaboration or referral systems** (12%) and **inadequate educational resources or materials** to support nutritional counseling (8%).

These findings suggest that both individual and systemic factors contribute to the limited integration of nutrition in physical therapy, and that addressing these areas could significantly improve holistic patient care.

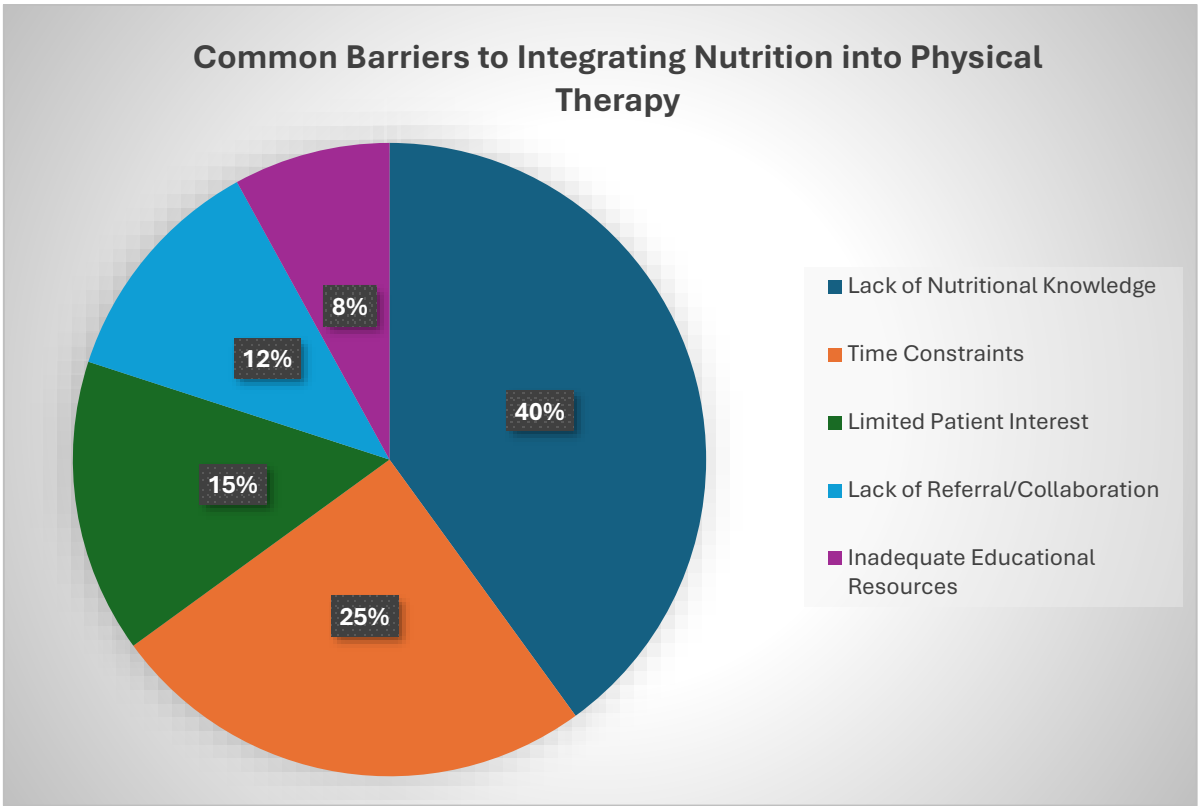

Figure 2: Common Barriers to Integrating Nutrition into Physical Therapy

Correlation Between Knowledge and Counseling Behavior

Pearson correlation analysis revealed a moderate positive relationship between participants' nutritional knowledge scores and their frequency of nutritional counseling ($r = 0.42$, $p < 0.01$). This suggests that therapists with higher nutritional knowledge are more likely to incorporate dietary advice into their clinical sessions. Moreover, therapists who reported personal adherence to healthy dietary practices (as measured by the Nutritional Lifestyle Scale) were also more inclined to offer nutritional guidance, indicating a link between personal and professional behavior.

Discussion

This study examined the integration of nutritional strategies into physical therapy practice, focusing specifically on therapists' nutritional knowledge levels and the extent to which they engage in nutritional counseling during clinical care. The findings reveal a clear gap between the recognized importance of nutrition in rehabilitation and its practical application among physical therapists.

The demographic analysis indicated a diverse and representative sample of therapists in terms of age, gender, experience, and specialization. Notably, most respondents were mid-career professionals working in orthopedic and neurological rehabilitation fields where recovery outcomes are significantly influenced

by nutritional status. Yet, despite their extensive clinical exposure, the majority of these professionals lacked adequate training and confidence to provide nutritional guidance.[7]

A striking finding was that only 15% of participants demonstrated high levels of nutritional knowledge, with the majority falling into the moderate (50%) or low (35%) categories. This aligns with previous studies reporting limited nutrition education in physical therapy programs globally, despite calls from professional bodies for a more interdisciplinary, patient-centered approach to rehabilitation. The knowledge gap is concerning, given the wealth of evidence linking nutritional adequacy to improved musculoskeletal healing, reduced inflammation, and better functional outcomes post-injury or surgery.[8]

The frequency of nutritional counseling in practice mirrored the knowledge distribution. While a small group of therapists regularly incorporated nutritional guidance, 58.3% either never or rarely discussed nutrition with their patients. This hesitancy likely stems from a combination of limited knowledge, perceived professional boundaries, and lack of training in patient-centered nutrition communication. Furthermore, many therapists expressed uncertainty about the legal and ethical parameters of providing nutritional advice without being registered dietitians—a valid concern that underscores the need for clear practice guidelines and interprofessional collaboration frameworks.[9]

Barriers to integration were multifactorial. The most cited constraint was a lack of nutritional knowledge (40%), followed by time limitations during therapy sessions (25%). These challenges reflect a systemic issue within the profession, where rehabilitation goals are often narrowly defined in biomechanical terms, overlooking the biopsychosocial and physiological dimensions of recovery. Interestingly, patient-related factors, such as limited interest in or adherence to nutritional advice, were also noted (15%), suggesting the need for better patient education and engagement strategies.[10]

Another notable barrier was the lack of collaboration with dietitians and nutritionists. Only 12% of therapists reported having access to established referral pathways or collaborative structures with nutrition professionals. This lack of interdisciplinary communication limits the delivery of comprehensive care and reinforces professional silos, which ultimately may delay or compromise patient outcomes.[11]

The positive correlation between nutritional knowledge and counseling frequency ($r = 0.42$, $p < 0.01$) further validates the central hypothesis of this study: that improving therapists' nutritional competency could lead to increased incorporation of dietary strategies in rehabilitation settings. Additionally, the finding that therapists with healthier personal dietary habits were more likely to counsel patients on nutrition suggests that lifestyle modeling may play a role in professional behavior a finding supported by similar studies in nursing and public health.[12]

Taken together, these results highlight an urgent need to integrate basic nutritional science into the core curriculum of physical therapy education, as well as offer targeted continuing education for practicing clinicians. Short courses, certifications, and structured workshops especially those developed in partnership with dietitians could empower therapists to deliver safe, evidence-informed dietary guidance as part of a broader rehabilitation plan. At the institutional level, rehabilitation centers should consider developing interdisciplinary care models that actively include nutrition professionals as part of the rehab team.[13]

While the study's findings are compelling, they should be interpreted in light of certain limitations. The sample was drawn from a specific geographic region, and though diverse, may not fully represent national or international practice patterns. Additionally, self-reported data are subject to recall bias and social desirability bias, particularly in questions regarding counseling frequency or lifestyle habits.[15]

Nonetheless, the findings provide a strong foundation for further research and professional advocacy. Future studies should explore intervention-based models where physical therapists receive structured nutritional training, with outcomes measured in terms of patient satisfaction, recovery metrics, and interdisciplinary collaboration effectiveness.

Limitations

While this study offers valuable insights into the integration of nutritional strategies within physical therapy, it is not without limitations. The sample was region-specific and may not fully represent the broader population of physical therapists in different national or international contexts. As the data collection relied on self-reported responses, there is a possibility of bias—participants might have overestimated their counseling practices or knowledge due to social desirability or recall inaccuracies. Additionally, the cross-sectional design limits the ability to draw causal inferences between knowledge levels and behavior; it only reflects associations at a single point in time. The

exclusion of perspectives from other stakeholders, such as registered dietitians or patients, also restricts the depth of understanding regarding interdisciplinary dynamics and patient receptiveness to nutrition-focused rehabilitation.

Suggestions

In light of the findings and limitations, several considerations can be made for future research and clinical practice. There is a clear need to integrate foundational nutrition education within physical therapy academic curricula to equip graduates with basic but essential dietary knowledge applicable to patient recovery. For practicing clinicians, structured continuing education programs developed in collaboration with nutrition professionals could enhance competence and confidence in delivering safe nutritional advice. Furthermore, promoting interdisciplinary teamwork through formal referral pathways and collaborative care models could strengthen the integration of nutritional strategies into rehabilitation settings. Future research should consider longitudinal or intervention-based designs to better understand the long-term impact of such efforts on both therapist behavior and patient outcomes.

Conclusion

This study underscores the significant gap between the acknowledged importance of nutrition in rehabilitation and its actual integration into physical therapy practice. While physical therapists are uniquely positioned to influence patient behavior and recovery through holistic interventions, the majority lack the necessary nutritional knowledge and confidence to incorporate dietary guidance into clinical care. The positive correlation between nutritional knowledge and counseling frequency further reinforces the potential for improved outcomes through targeted education. Bridging this knowledge-practice gap through interdisciplinary collaboration, education reform, and clinical support can lead to more comprehensive, patient-centered rehabilitation outcomes. Integrating nutritional strategies into physical therapy is not only feasible but essential in modern rehabilitation frameworks.

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