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Investigating the Health Diet Needs of Diabetic Elderly in Daily Life: A Systematic Review

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Abstract: Diabetes has increasingly affected populations over the decades, particularly among elderly groups. Maintaining a healthy diet is crucial for managing diabetes, yet elderly people with diabetes often exhibit poor dietary habits. Therefore, this paper aims to investigate the dietary needs of elderly individuals with diabetes to provide comprehensive guidance for improving their dietary habits and overall diabetes management. A systematic review approach was adopted in this study, three reference databases, Scopus, Web of Science, and PubMed were consulted; 28 articles were screened in the final data code and analysis. Results found that four important needs among diabetic elderly include healthy diet knowledge, dietary suggestions, glucose monitoring, and physical activity. Those findings reveal the significance of diabetes management, underscoring the need for targeted educational interventions. Personalized nutrition plans and user-friendly glucose monitoring technologies are essential for improving dietary adherence and blood glucose control. Barriers to regular physical activity, including mobility issues and fear of injury, highlight the need for tailored, enjoyable exercise programs. Addressing these issues through holistic and individualized approaches can enhance diabetes management and health outcomes for this population. The study emphasizes the need for healthcare providers to develop and implement personalized nutrition plans, user-friendly glucose monitoring devices, and tailored exercise programs to support better diabetes management in the elderly population. Future research should focus on creating and testing these user-friendly products to further enhance care for this vulnerable group.

Keywords: *Ageing, Diabetes, Daily needs. Diabetic elderly, Healthy diet,*

1. Introduction

The prevalence of diabetes among the elderly is in a soar rising over the years, presenting significant challenges for healthcare systems worldwide [1]. Elderly people with diabetes face a unique set of complications, including higher risks of cardiovascular diseases, neuropathy, and kidney failure. Additionally, age-related physiological changes can exacerbate the difficulties in managing blood glucose levels [2]. These compounded health issues highlight the urgent need for specialized care and attention to the dietary habits of diabetic elderly people to improve their overall health and quality of life [3].

A healthy diet plays a crucial role in managing diabetes, particularly for the elderly. Proper nutrition can help regulate blood sugar levels, reduce the risk of complications, and improve overall well-being [4]. However, many diabetic elderly struggle with maintaining a balanced diet due to factors such as limited access to healthy foods, lack of nutritional knowledge, and the presence of coexisting

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medical conditions that affect appetite and digestion [5]. These deprivations and deficiencies in healthy eating underscore the necessity for targeted dietary interventions and support for this demographic [6].

This paper aims to investigate the healthy diet needs of diabetic elderly people in their daily lives through a systematic review. By synthesizing current research, the study seeks to provide comprehensive insights into the specific nutritional requirements, dietary patterns, and practical strategies that can support optimal health outcomes for this vulnerable population. Understanding these dietary needs is essential for healthcare providers, caregivers, and policymakers to develop and implement effective nutrition-based interventions such as smart products or applications for diabetic elderly in future research, ultimately improving the well-being and longevity of diabetic elderly people.

2. Methodology

2.1. Search Strategy

This research adopted a systematic review approach to search and screen related articles that focus on a certain topic on the daily healthy diet needs of the diabetic elderly [7]. Articles were searched through the databases of Scopus, Web of Science (WoS) and PubMed, using keyword that are extracted as follows: (("diabete* old*" OR "diabete* elder*" OR "diabete* aged" OR "diabete* senior*") AND ("health* diet*" OR diet*) AND (need* OR demand* OR requirement*)). Then those keyword terms are keyed in to search for specific research in Scopus, WoS and PubMed databases. The search period time was set to cover the publication years from 2014 to 2024. As a search result listed in Table 1, finally, a total number of 118 articles were found.

Table 1.
Search strings from Scopus, WoS and PubMed.

Scopus	title-abs-key ("Diabete* old*" or "Diabete* elder*" or "Diabete* aged" or "Diabete* senior*") and title-abs-key ("Health* diet*" or diet*) and title-abs-key (Need* or demand* or requirement*)	20 results
WoS	(TS= ("Diabete* old*" or "Diabete* elder*" or "Diabete* aged" or "Diabete* senior*") and TS= ("Health* Diet*" or diet*) and TS= (Need* or demand* or requirement*))	9 results
PubMed	("diabete* old*" OR "diabete* elder*" or "diabete* aged" OR "diabete* senior*") and ("health* diet*" or diet*) and (need* or demand* or requirement*)	89 results

2.2. Study Selection

In the process of selecting the collected articles, those 118 articles will be carefully selected and removed according to the criteria listed in Table 2. Before proceeding to the next screening process, duplicate articles were removed. For those articles that go through the screening process, the full-text article of each study was independently examined by the author.

Table 2.
Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
(a) Articles include health diet content of diabetic elderly. (b) Articles focus on diabetic elderly's diet needs. (c) Access to the full articles.	(a) Diet habit but not diabetic elderly. (b) Diabetic elderly's issue and needs does not focus on health diet. (c) Health diet needs not from diabetic elderly. (d) Inaccessibility to full text articles. (e) Non-peer review articles (Conference proceeding). (f) Grey literature (Thesis, dissertation, book, government report).

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2.3. Assessment of Study Quality

Each article's quality was assessed by the Critical Appraisal Skills Programme (CASP)'s Quality Appraisal Tool systematic review checklist, and the result is presented in the form of a table. CASP is a tool that assists researchers in critically evaluating the quality of research studies. It provides a structured framework for assessing various aspects of study design, methodology, analysis, and reporting, helping users determine the trustworthiness, relevance, and validity of research findings [8].

3. Results

3.1. Screen the Article Results

The PRISMA screen flow is presented in Figure 1. Through a systematic search, a total of 118 articles were identified, later 11 of those articles were found to be duplicates and were eliminated. As a result, 107 articles still needed to be screened. The first screening process was the title screening, unrelated title articles were removed in this process, accounting for 45 articles; abstracts that did not focus on topics were also removed. Therefore, a final 13 articles were removed. The remaining articles were further screened according to inclusion and exclusion criteria; therefore, another 21 articles were removed. The remaining 28 articles were assessed for eligibility and extracted for literature review.

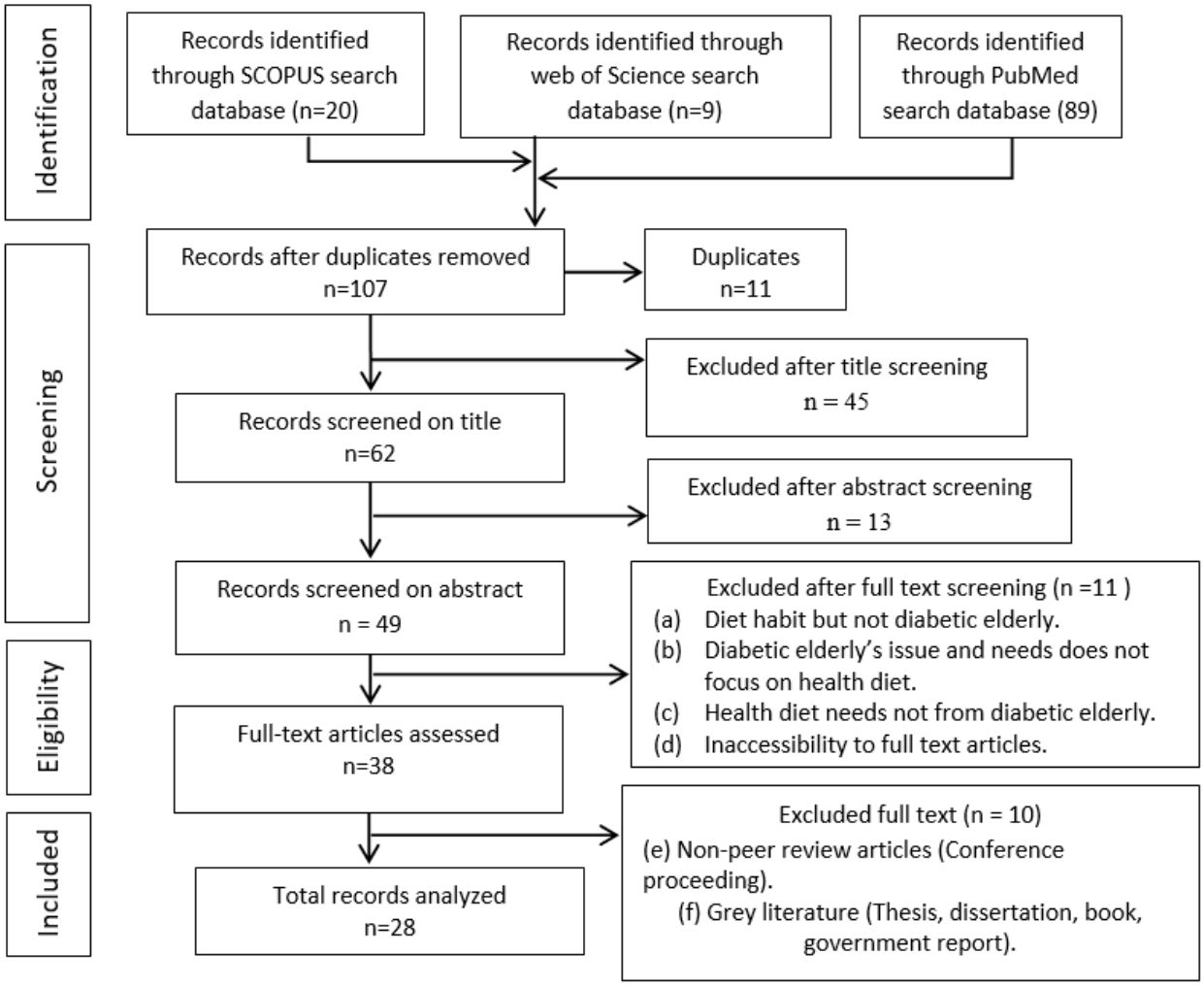

Figure 1.
Flow chart of search strategy based on PRISMA flow diagram.

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3.2. Data Extraction and Analysis

Several attributes were coded and analyzed under this study's research aims. These characteristics are as follows: The remaining research articles were subjected to quality screening based on the various inclusion and exclusion criteria mentioned in Table 2. Therefore, the final articles were reviewed down to 31 articles as shown in Figure 1. These articles were incorporated into the final step of data coding and analysis. According to the final screened articles, four themes can be classified, they were: (a) Needs for healthy diet knowledge; (b) Needs for healthy diet suggestion; (c) Needs for glucose monitoring; (d) Needs for activities. The following parts will elaborate those themes sequentially.

3.3. Needs for Healthy Diet Knowledge

6 studies focused on analyzing the healthy diet knowledge among diabetic elderly. The synthesis and details of these 6 studies are presented in Table 3, including publication year, thematic focus, research objectives, geographical context, methodological data particulars in each article.

Results revealed a significant gap in healthy diet knowledge among diabetic elderly. According to researchers' investigation, many diabetic elderly lacked an understanding of the importance of glycemic control and the role of nutrient-dense foods in managing their condition [9]. Studies highlighted that misinformation and outdated dietary beliefs were prevalent, leading to suboptimal food choices that could exacerbate diabetes complications [10].

First, many diabetic elderly demonstrated a lack of understanding regarding the importance of glycemic control. They were not fully aware of how dietary choices can influence blood sugar levels, leading to potential complications. It's urgent and crucial for the diabetic elderly to develop an awareness of choosing suitable food to control their glycemic levels. For example, some elderly people mistakenly believe that all fruits are harmful due to their sugar content, disregarding the benefits of low glycemic index fruits like berries and apples [11]. Therefore, the awareness of how food choices influence glycemic levels needs to be understood by the diabetic elderly.

Besides, diabetic elderly also lack food nutrition awareness knowledge. The role of nutrient-dense foods in managing diabetes was also not well understood by them according to the literature review [12]. Elderly people often prioritized taste and convenience over nutritional value, leading to suboptimal food choices. Studies have shown that misinformation and outdated dietary beliefs were prevalent, exacerbating diabetes complications [13].

Therefore, educational interventions that focus on the specific nutritional needs of diabetic elderly people were found to be effective in improving dietary habits and overall health outcomes. For instance, workshops and cooking classes that demonstrate how to prepare balanced meals with appropriate portion sizes can significantly enhance dietary knowledge and practices. Tailored educational programs that address common misconceptions and provide practical advice on meal planning and food selection are essential to empower this population to make healthier choices [14].

3.4. Needs for Healthy Diet Suggestion

10 studies elaborated on the healthy diet suggestion needs from diabetic elderly. The synthesis and details of these 10 studies are presented in Table 4, including publication year, thematic focus, research objectives, geographical context and methodological data particulars in each article.

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Table 3.
Studies that focused on healthy diet knowledge among diabetic elderly.

Author(s)/ Year	Thematic focus	Objectives	Country	Participants (Sample)	Data collection	Data analysis
E. Morris et al., 2019	Diet management	Test whether a newly developed programme can effectively deliver a healthy diet.	UK	Older adult people with diabetes (N=30)	Experiment	Statistical analysis
A. A. Tam et al., 2020	Latent autoimmune diabetes	Determine the frequency of and the clinical and metabolic features of patients with latent autoimmune diabetes in older adults at a single center in Turkey.	Turkey	Latent autoimmune diabetes (N=324)	Experiment and interviews	Statistical analysis
X. Lin, S. Wang, and J. Huang, 2023	EAT–Lancet diet and diabetes	Conduct a systematic review to analyze and summarize all clinical studies concerning the association between diabetes and the EAT–Lancet diet.	China	Elderly diabetes (N=674)	Literature review	Meta analysis
A. Alshahrani et al., 2024	Food labeling knowledge	Explore the barriers that prevent patients from reading food labels.	Saudi Arabia	Elderly diabetes (N=310)	Experiment	SPSS
A. Jairoun et al., 2024	Care services for diabetes	Investigate community pharmacists' level of expertise and engagement in providing counseling and health promotion services for individuals with DM.	United Arab Emirates	Elderly diabetes (N=192)	Cross-sectional study, face-to-face interviews, questionnaire	SPSS
Y. Yang, S. Charlebois, and J. Music, 2024	Menu health logos	Explores the potential application of FOPLstyle health logos in the food service sector and its impact on consumer behaviors.	Canada	Elderly diabetes (N=1070)	Survey	Statistical analysis

Table 4.
Studies that focused on the healthy diet suggestion needs of diabetic elderly.

Author(s)/ Year	Thematic focus	Objectives	Country	Participants (Sample)	Data collection	Data analysis
M. Asif, 2014	Lifestyle and dietary pattern	Prevent this condition, action should be taken regarding the modifiable factors that influence its development-lifestyle and dietary habits.	India	/	Literature review	Meta analysis
Y. Li, J. Ding, Y.	Nutrition-related	Evaluate the functionality and quality of	China	Mobile	Literature	Meta

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Wang, C. Tang, and P. Zhang, 2019	apps	nutrition-related apps in China.		applications for diabetes (N=44)	review	analysis
H. N. C. Fu, R. F. Rizvi, J. F. Wyman, and T. J. Adam, 2020	Diabetes applications	Conduct a systematic review to analyze and summarize all clinical studies concerning the association between diabetes and the EAT–Lancet diet.	/	Mobile applications for diabetes (N=4)	Expert evaluation	Statistical analysis
Y. Zhai and W. Yu, 2020	Diabetes mobile app	Assess whether the diabetic management app could improve glycemic control and diabetes self-efficacy.	China	Diabetes elderly using app (N=120)	Experiment	SPSS
N. M. Abdul Khalil, F. H. Mohd Mydin, and F. M. Moy, 2023	Mobile applications for diet monitoring	Explore the perceptions, views, and experiences of healthy Malaysian adults with diet monitoring apps.	Malaysia	Malaysia elderly diabetes (N=192)	Interview	Atlas.ti
V. Guan et al., 2023	Mobile applications	Provide personalized, evidence-based support for self-managing food choices in real time.	Australia	Elderly diabetes using app (N=15)	Interview	Atlas.ti
S. Gioia et al., 2023	Mobile apps for dietary and food timing assessment	Establish which one would be the most appropriate for clinical research	United States	Elderly diabetes using app (N=11)	Experiment	Statistical analysis
M. Rapinski, A. Cuerrier, and D. Davy, 2023	Dietary management of diabetes	Hypothesize that local populations will adapt their dietary practices considering diabetes as an emerging health problem.	French	Community members, Elders and healthcare professionals (N=75)	Interview	Atlas.ti
K. P. Davies, E. R. Gibney, and A. M. O'Sullivan, 2023	Sustainable diets	Develop personalised recommendations for a more sustainable and healthy diet in a European context.	European	Literature about diebetic elderly's diet	Literature review	Meta analysis
A. Y. Almousa et al., 2023	Knowledge, attitude, and practice toward diabetes mellitus	Assess knowledge, attitude, and practice toward diabetes mellitus (T2DM) and its association with socioeconomic status among adult patients with T2DM.	Saudi Arabia	Diebetic elderly (N=934)	Questionnaire	SPSS

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The need for personalized healthy diet suggestions was a recurring theme across the literature reviewed. Elderly people with diabetes expressed a desire for clear, practical dietary recommendations that consider their unique health conditions, preferences, and socioeconomic constraints [15]. Generic dietary advice often failed to resonate with this demographic, leading to poor adherence and confusion [16]. To bridge the gap in healthy diet knowledge, there is a clear need for targeted dietary suggestions that are both practical and accessible to diabetic elderly [17].

Personalized nutrition plans, developed in collaboration with healthcare professionals, were shown to significantly improve dietary adherence and blood glucose control. These plans should include easy-to-prepare, affordable, and culturally appropriate meal options to enhance compliance and ensure nutritional adequacy [18]. These plans should emphasize the inclusion of nutrient-dense foods and provide clear guidance on portion sizes. Providing culturally sensitive dietary advice is also essential. Understanding the dietary habits and preferences of different cultural groups can help in designing meal plans that are more likely to be accepted and followed [19].

As mentioned before, in the Internet of Things (IoT) age nowadays, mobile applications have the important potential to revolutionize the way diabetic elderly receive healthy diet suggestions and nutrition monitoring [20]. These apps can provide real-time, personalized feedback based on the user's dietary habits, health data, and preferences, making dietary management more accessible and user-friendly [21]. For instance, mobile apps equipped with AI algorithms can analyze food intake through photos and offer immediate nutritional information, helping users make informed decisions about their meals [22]. For example, an app might detect elevated blood sugar levels and suggest a meal plan that helps to stabilize glucose levels [23]. Moreover, the convenience of mobile apps allows elderly people to access dietary advice anytime and anywhere, overcoming barriers such as mobility issues or limited access to healthcare facilities. The use of mobile apps for diet management has been associated with improved self-efficacy and better dietary outcomes in diabetic patients [24].

3.4. Needs for Glucose Monitoring

5 studies elaborated on the glucose monitoring needs of diabetes. The synthesis and details of these 5 studies are presented in Table 5, including publication year, thematic focus, research objectives, geographical context and methodological data particulars in each article.

Effective glucose monitoring is crucial for managing diabetes, yet the review identified several barriers that elderly people face in this regard [25]. Many diabetic elderly reported difficulties in using glucose monitoring devices due to age-related physical limitations such as poor vision, reduced dexterity, and cognitive impairments. Additionally, the high cost of monitoring equipment and supplies was a significant obstacle for some [26].

Education on the proper use of glucose monitors and financial assistance programs were found to be beneficial in addressing these challenges. For instance, teaching elderly people how to use voice-assisted glucose meters or larger screen devices can improve usability [27]. Regular monitoring, coupled with immediate feedback and support from healthcare providers, can help elderly people better manage their blood glucose levels and adjust their diets accordingly [28]. Ensuring that glucose monitoring devices are accessible and easy to use is crucial. This may involve providing financial assistance for the purchase of these devices or offering training sessions to help elderly individuals become more comfortable with their use [29].

3.5. Needs for Activities

7 studies elaborated on the daily activities of diabetic elderly. The synthesis and details of these 7 studies are presented in Table 6, including publication year, thematic focus, research objectives, geographical context and methodological data particulars in each article.

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Table 5.
Studies that elaborated on the glucose monitoring needs of diabetes.

Author(s)/ Year	Thematic focus	Objectives	Country	Participants (Sample)	Data collection	Data analysis
N. P. Gordon and E. Crouch, 2019	Digital information technology	Examine how use of digital information technologies and preferred methods for obtaining health information and advice varies by age group and education among middle-aged and older adults with chronic health conditions.	United States	Older adults with diabetes (N=9005)	Survey	Statistical analysis
B. J. Turner, Y. Liang, 2020	Health worker care management	Improve both diabetes and hypertension control among patients with diabetes.	United States	Diabetes	Experiment	Statistical analysis
C. Whiteley, F. Benton, L. Matwiejczyk, and N. Luscombe-Marsh, 2023	Recommend for Type 2 Diabetes	Identify the most effective dietary patterns using a food-focused approach to improve blood glucose management (primary outcome) and cardiovascular risk factors (Secondary outcome) in people with type 2 diabetes.	Australia	Mobile applications for diabetes (N=4)	Expert evaluation	Statistical analysis
A. Gómez Medina et al., 2024	Glucose management indicator	Describe the concordance and reproducibility between HbA1c and GMI, in patients with diabetes, CKD, and anemia, using is CGM.	American	Diabetes elderly (N=86)	Experiment	Statistical analysis
R. Kiconco, S. A. Lumumba, C. N. Bagenda, R. Atwine, J. Ndarubweine, and S. P. Rugera, 2024	Insulin therapy	Describe a brief background on the status quo of diabetes mellitus-related therapies and glycemic control among patients in rural communities.	Africa	Related paper	Literature review	Meta analysis

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Table 6.
Studies that elaborated on the daily activities of diabetic elderly.

Author(s)/ Year	Thematic focus	Objectives	Country	Participants (Sample)	Data collection	Data analysis
M. Samson and T. Trivedi, 2016	Environment in the prevention of type 2 diabetes	Understand which methods will have the most positive effects in reducing the financial and social burden of T2DM.	USA	Related paper	Literature review	Meta analysis
B. Larsen, S. Micucci, S. J. Hartman, and G. Ramos, 2020	M-health-based physical activity intervention for diabetes	Assess the feasibility and acceptability, and explore the potential efficacy of a counseling- and mobile health–based physical activity intervention for diabetes.	USA	Diabetic participants (N=17)	Experiment	Statistical analysis
J. Sinclair et al., 2022	Home-based physical activity programme	Undertake a randomized control trial, examining the effects of a 12-week home-based physical activity programme in Saudi Arabian adults with type-2 diabetes.	Saudi Arabia	Diabetic participants (N=62)	Experiment	Statistical analysis
T. N. N. Aung et al., 2022	Health-related quality of life	Describe the HRQOL of Thai older adults, residing in the community.	Thailand	Elderly participants (N=1509)	Experiment	Statistical analysis
S. F. H. Bokhari and A. Mushtaq, 2023	Mental health of diabetic elderly	Explores the interplay between mental health and physical symptoms, aiming for innovative therapies and improved patient care.	/	Related paper	Literature review	Meta analysis
D. Sherifali et al., 2024	Type 2 diabetes management	Understand the definitions, models of peer support, and experiences with peer support in patients with CMDs with a focus on T2DM in LMICs.	/	Related paper	Literature review	Meta analysis
J.-Y. Liao, Y.-Y. Lien, Y. Liao, and Y.-J. Lien, 2024	Physical activity	Examine the mediation effect of physical activity on the relationship between self-perceptions of aging and depressive symptoms among older adults.	Taiwan	Diabetic participants (N=65)	Questionnaire	SPSS

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Physical and social activities are integral components of diabetes management, yet the review highlighted a lack of engagement among the elderly diabetic population to meet diabetic elderly's healthy diet daily needs. Factors such as mobility issues, fear of injury, and a lack of suitable exercise programs were commonly cited barriers [30]. Studies emphasized the importance of incorporating low-impact, enjoyable activities tailored to the abilities and interests of elderly people. Programs that combine physical activity with social interaction, such as group exercises or community walking clubs, were particularly effective in increasing participation and improving overall health [31]. Encouraging regular physical activity, even in small amounts, can significantly enhance the management of diabetes and contribute to better physical and mental well-being [32].

Identifying activities that are safe and suitable for diabetic elderly is crucial. These activities should be tailored to their physical capabilities and health conditions, ensuring that they can participate without risking injury. Providing encouragement and support for elderly individuals to engage in physical activity is essential. This can involve setting achievable goals, offering rewards for participation, and creating a supportive community that encourages regular activity. Integrating physical activity with dietary management can enhance the overall management of diabetes. Activities should be designed to complement dietary plans, helping elderly individuals understand the relationship between diet and exercise in managing their condition [33].

Social activities play a crucial role in the well-being of the diabetic elderly, as they can reduce feelings of isolation and depression, which are common in this demographic. Engaging in social activities has been shown to improve mental health, increase adherence to diabetes management plans, and enhance overall quality of life [34]. Examples of effective social activities include support groups, hobby clubs, and volunteer opportunities that foster a sense of community and belonging, participation in diabetes support groups can provide peer support and shared experiences, which can motivate individuals to adhere to their dietary and physical activity plans [35]. Additionally, community centres offering social events and activities tailored to older adults can create an environment where they feel valued and engaged. Encouraging participation in these social activities can help elderly individuals build strong social networks that support their diabetes management and overall health [36].

4. Discussion

The findings of this systematic review underscore the multifaceted needs of elderly people with diabetes in their daily lives. As Figure. 1 elaborates below, addressing these needs through targeted educational interventions, personalized dietary suggestions, accessible glucose monitoring, and appropriate physical activity programs is essential for improving health outcomes and quality of life for this vulnerable population.

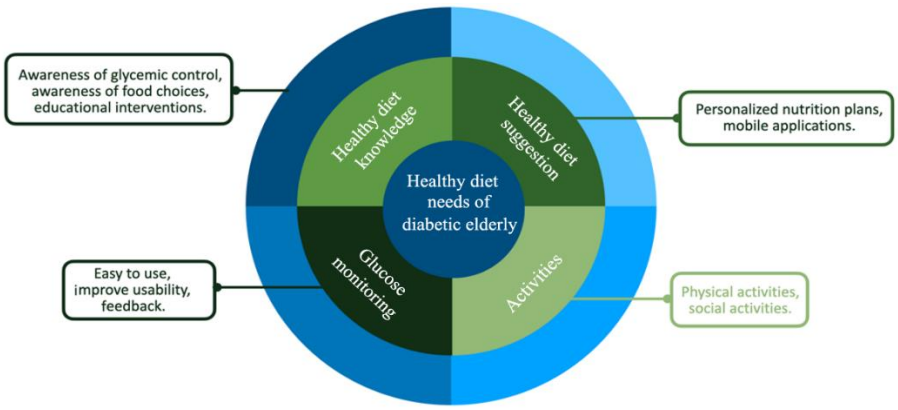

Figure 2.
Key findings on healthy diet needs of diabetic elderly.

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The findings of this review underscore the multifaceted challenges in managing diabetes among elderly people, highlighting significant gaps in healthy diet knowledge, the need for personalized dietary suggestions, and barriers to effective glucose monitoring and physical activity. Addressing these issues requires targeted educational interventions that dispel misconceptions, practical and individualized nutrition plans, user-friendly glucose monitoring technologies, and accessible, enjoyable physical activities. Incorporating these strategies into clinical practice and public health policies can enhance diabetes management and improve health outcomes for elderly people with diabetes. Future research should focus on effective education, the long-term impacts of personalized diets, and the development of accessible technologies and community-based exercise programs.

Despite the insights provided by this review, several limitations and future challenges must be acknowledged. Many studies relied on self-reported and literature review data, which can be subject to biases and inaccuracies. Future research should use qualitative methodology such as interviews to enhance data reliability. Another challenge is the integration of these interventions into real-world settings, considering the development of user-friendly, cost-effective products that can be widely adopted by elderly populations with varying degrees of technological literacy.

5. Conclusion

This paper aims to investigate the critical dietary and health needs of elderly people with diabetes, emphasizing the importance of tailored educational interventions, personalized dietary suggestions, accessible glucose monitoring, and suitable physical activity programs. Addressing these multifaceted needs can significantly enhance diabetes management and improve health outcomes for this vulnerable population. In conclusion, addressing the need for healthy diet knowledge, suggestions, glucose monitoring, and activities among elderly individuals with diabetes is crucial for improving their health outcomes. Tailored educational programs, practical dietary advice, accessible monitoring tools, and safe physical activities are key components in empowering this population to manage their condition more effectively. By prioritizing these areas, healthcare providers, policymakers, and community organizations can work together to support the well-being and quality of life of elderly people with diabetes.

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