I. INTRODUCTION

Lifestyle changes have significantly impacted people's behaviors and habits, ultimately leading to the emergence of chronic health problems. The number of diabetes cases is increasing due to factors such as population growth, aging, urbanization, rising obesity rates, and a lack of physical activity [1]. Diabetes, particularly Type 2 diabetes, has become one of the major health challenges in many countries. Younger individuals diagnosed with diabetes lose more years of life compared to those diagnosed at an older age [2]. This highlights the need for a holistic approach to diabetes management that focuses on both medical treatment and adopting a healthy lifestyle. Diet quality is a key factor influencing the risk of diabetes. Regular, healthy eating habits can reduce the risk of progressing from prediabetes to diabetes by 40–70% [7].

In efforts to achieve a healthy lifestyle, diet plays a crucial role in diabetes management by stabilizing blood sugar levels and preventing complications. A low glycemic index (GI) diet has proven particularly beneficial for diabetic patients. However, selecting foods that meet the glycemic and nutritional needs of diabetic patients is complex. Food recommender systems have emerged as valuable tools to address this challenge by helping diabetic patients make informed food choices tailored to their health conditions. These systems help users navigate individual preferences, dietary restrictions, and glycemic needs, providing a practical solution for daily diabetes management.

Previous studies have explored ontology-based approaches for dietary recommendations. Ali et al. [11] successfully implemented a type-2 fuzzy ontology for food menu recommendations, demonstrating significant improvements over traditional methods. However, their system faced challenges such as incomplete data from wearable sensors and a lack of focus on glycemic index considerations. Building on this work, our study integrates low-GI data and detailed nutritional information to enhance the relevance and accuracy of dietary recommendations for diabetic patients. Similarly, Sicilia et al. [5] developed a chatbot-based food recommender system with a high F1- score of 0.97, providing food suggestions personalized to user details such as age, gender, and medical history. While effective for obesity prevention, this system did not address glycemic index specific needs, leaving a gap for diabetes management.

This study addresses these gaps by developing an ontology-based menu recommender system specifically designed for diabetic patients. The system utilizes the Ontology Web Language (OWL) to model relationships between food items, glycemic index values, and user- specific dietary needs. By using OWL, the system ensures that recommendations are structured, personalized, and nutritionally balanced. In addition to glycemic index-based recommendations, the system provides detailed information on ingredients, recipes, and nutritional facts, enhancing the user experience by making the food selection process intuitive. The evaluation was conducted through an inter- view with the nutritionist, where the expert was asked to assess and approve the system's recommendations based on their suitability and alignment with the dietary needs of individuals with diabetes, with the ultimate goal of improving dietary adherence and reducing complications associated with diabetes.