THE USE OF ARTIFICIAL INTELLIGENCE IN DIET COUNSELLING: A COMPREHENSIVE REVIEW

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Abstract
Artificial intelligence (AI) is transforming diet counselling by enabling more personalized nutrition advice, improving dietary assessment accuracy, and increasing accessibility of interventions. This review examines key AI applications, benefits, limitations, evidence of effectiveness, validated diet-quality metrics, and methodological approaches in AI-based diet counselling. Emerging evidence suggests AI-generated diet plans rival human-developed plans in quality and user satisfaction, highlighting AI's growing potential as a complementary tool in dietetic practice.
Keywords: *Diet counselling, AI, nutritional plan, accuracy, dietetic practice*

Introduction

Diet counselling remains a cornerstone of chronic disease prevention and health optimization. The advent of AI techniques such as machine learning, natural language processing, and deep generative networks enables new possibilities for personalized, adaptive nutrition advice. These advancements allow for high-throughput dietary data analysis, tailored recommendations based on health status and genetics, and real-time user engagement via chatbots or mobile platforms. Integration of nutritional expert knowledge into AI systems ensures accuracy and clinical relevance (Phalle & Gokhale, 2025; Agrawal, 2025; Detopoulou, 2023).

Methodology

This comprehensive review was conducted using a structured and systematic approach to identify, analyze, and synthesize relevant literature on the application of Artificial Intelligence (AI) in diet counselling**.**

Result and Discussion

AI Applications in Diet Counselling

AI applications span personalized nutrition plans integrating anthropometric, biomarker, and genetic data with lifestyle preferences to optimize energy and nutrient intake; automated dietary assessments employing image recognition of meals and wearable device tracking; adaptive AI chatbots providing interactive This comprehensive review was conducted using a structured and systematic approach to identify, ancounselling. and motivational support; and condition-specific dietary management targeting obesity, diabetes, and cardiovascular diseases (Agrawal, 2025; Fadhil & Gabrielli, 2025; Detopoulou, 2023). Recent systems combine deep generative networks with large language models like ChatGPT, integrating expert-validated nutritional guidelines such as EFSA and WHO for optimized weekly meal plans (Phalle & Gokhale, 2025).

Benefits of AI in Diet Counselling

AI-driven dietary assessments demonstrate higher precision and reliability than traditional manual methods. Digital platforms overcome geographical and resource limitations, increasing reach to diverse populations. Algorithms adapt recommendations to individual biology, preferences, and medical conditions, enhancing adherence and outcome efficacy. Continuous monitoring and instant feedback support behavior modification and sustained long-term dietary changes (Phalle & Gokhale, 2025; Fadhil & Gabrielli, 2025).

Limitations and Challenges

Limitations include AI recommendations sometimes lacking cultural and socioeconomic sensitivity, and requiring further refinement for portion size control and macronutrient balance (Phalle & Gokhale, 2025). Continuous clinical validation and algorithm transparency are essential to avoid inaccuracies and ensure safety (Phalle & Gokhale, 2025; Agrawal, 2025). Ethical concerns regarding data privacy, consent, and bias in training data must also be managed (Detopoulou, 2023).

Evidence of Effectiveness

Randomized trials and observational studies show AI-generated diet plans exhibit high diet-quality scores measured by validated metrics such as the Diet Quality Index-International (DQI-I), with scores >70 indicating balanced nutrition. One randomized pilot study found AI-guided dietary supplement prescriptions resulted in an average weight loss of 12.3% over 180 days, significantly outperforming physician-guided care at 7.2% (Phalle & Gokhale, 2025; Agrawal, 2025). Another longitudinal study reported an average 2.4 kg weight loss using an AI health coach over ~15 weeks (Agrawal, 2025). An AI-assisted mobile app program (eTRIP) demonstrated behavioral improvements linked to potential weight loss

benefits in a Southeast Asian cohort (Fadhil & Gabrielli, 2025).

Validated Diet-Quality Metrics in AI Studies

The DQI-I is the primary validated tool employed in AI diet studies, evaluating variety, adequacy, moderation, and balance on a 100-point scale (Phalle & Gokhale, 2025). Other metrics include the Mediterranean Diet Score, Healthy Eating Index, and Dietary Approaches to Stop Hypertension (DASH) score (Agrawal, 2025). Validation involves comparison to gold standard dietary assessment methods such as weighed food records, 24-hour recalls, and food frequency questionnaires, using correlation and Bland–Altman analyses (Phalle & Gokhale, 2025).

Research Methodology in AI Diet Counselling Studies

AI diet counselling research commonly integrates deep generative networks for personalized meal planning, variational autoencoders for user profiling, recurrent neural networks for meal sequencing, and custom loss functions embedding nutritional guidelines from WHO and EFSA (Phalle & Gokhale, 2025). Large datasets from international meal databases support model generalizability. Validation on both virtual and real user profiles ensures accuracy. Natural language processing powers chatbots delivering adaptive counselling with voice and text interfaces, accommodating cultural contexts and literacy levels. Clinical and real-world trials demonstrate feasibility and efficacy (Phalle & Gokhale, 2025; Fadhil & Gabrielli, 2025).

Conclusion

AI technologies are poised to be indispensable tools in diet counselling, delivering precise, personalized, and scalable nutrition care. Evidence confirms that AI-generated plans can match or exceed human-developed dietary advice in quality and user outcomes. Ongoing efforts to refine algorithms, ensure cultural adaptation, validate clinical safety, and address ethical concerns will be vital to integrating AI fully into routine dietetic practice, improving population health nutrition.

References

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