Digital *Halalan-Toyyiban* Intervention to Enhance Dietary Knowledge, Attitudes and Practices among University Students: An Exploratory Assessment

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ABSTRACT

This pilot study assessed the effectiveness of a Religious-Based Digital Intervention Tool (RB-DIT), grounded in the Halalan-Toyyiban dietary concept, to improve knowledge, attitudes, and dietary practices (KAP) among university students. 14 medical students participated in a 10-day intervention using a web-based educational platform. Paired sample t-tests revealed significant post-intervention improvements in knowledge (e.g., K7: $M = 1.429$, $p < 0.001$), attitudes (A1: $M = 1.000$, $p < 0.001$), and practices (P11: $M = 0.929$, $p < 0.001$). The RB-DIT demonstrated strong internal consistency (Cronbach's $\alpha = 0.823$) and received high user satisfaction ($M = 3.93$ out of 4.00). These findings underscore the potential of digitally delivered religiously grounded content to foster informed and ethical dietary choices among young adults. The RB-DIT offers a culturally congruent and scalable approach to nutrition education, as it merges Islamic principles with interactive, learner-centred design. This combination facilitates meaningful engagement and supports sustainable behavioural improvements in line with religious-based values.

Keywords: Pilot study, Halalan-Toyyiban, Digital Intervention, Religious-Based Intervention, Religious-Based Health Education, Islamic Dietary

INTRODUCTION

Background and Significance of the Halalan-Toyyiban Dietary Concept

The Halalan-Toyyiban concept is a central Islamic guideline for food and beverage consumption. It encompasses not only halal permissibility but also the quality, safety, and benefits of food, known as toyyib (Zakaria et al., 2024). Grounded in the Quran and the teachings of Prophet Muhammad (peace be upon him), this holistic approach promotes both physical health and spiritual well-being. In Muslim communities, adherence to these dietary principles is carefully maintained to ensure ethical sourcing, humane treatment of animals, and the avoidance of harmful substances (Sawari et al., 2015).

The Halalan-Toyyiban framework goes beyond religious observance, offering a practical model for preventive health. It addresses modern dietary concerns, such as the rising prevalence of non-communicable diseases including obesity, diabetes, and cardiovascular conditions. Promoting balanced and wholesome dietary practices, this concept aligns with global public health goals (Abidin et al., 2024).

Its significance can be seen in several dimensions. It supports the objectives of maqasid shariah, which prioritise the protection of human life and well-being. It also elevates the importance of food quality and safety,

incorporates both physical and spiritual needs, and guides the development of ethical and sustainable food systems. Importantly, it offers a culturally relevant approach to encouraging healthy dietary habits, particularly among youth, when integrated with digital technologies (Idris et al., 2018).

As a guiding framework, Halalan-Toyyiban empowers Muslims to make ethical and informed food choices (Zakaria et al., 2024). Embedding these principles into current dietary practices helps bridge generational and cultural divides. This relevance is especially critical among young people navigating complex food environments. Educational institutions, where students begin shaping lifelong eating habits, provide fertile ground for instilling the values of the Halalan-Toyyiban philosophy.

The significance of halalan and toyyiban consumption is deeply rooted in Islamic teachings. The Qur'an states: "O mankind, eat from whatever is on earth [that is] lawful and good (Halalan-Toyyiban) and do not follow the footsteps of Satan. Indeed, he is to you a clear enemy" (Qur'an, 2:168). Furthermore, the Prophet Muhammad (peace be upon him) said, "Verily, Allah is pure and He accepts only that which is pure" (Sahih Muslim). These textual foundations affirm the spiritual and moral imperative of ethical food consumption, reinforcing the relevance of this study.

Relevance of Digital Interventions in Improving Knowledge, Attitude, and Dietary Practices

Technology has become integral to modern life, including health education. A study by Olaoye et al. (2023) highlights how digital platforms are increasingly used to support dietary and nutrition interventions. These tools, accessible via smartphones, tablets, and computers, make health information more widely available and user-friendly (Prowse & Carsley, 2021).

Recent studies support this potential. For example, Ash et al. (2023) stress the importance of culturally aligned nutrition content in fostering long-term behaviour change among youth, while Cahaya et al. (2023) confirm that personalised digital tools enhance both comprehension and adherence in health interventions.

Digital interventions are particularly effective due to their ability to deliver personalised and interactive content (Marcu et al., 2022). Unlike traditional approaches, digital platforms offer tailored information to meet individual preferences and needs. Călinescu (2024) emphasises that such customisation increases user engagement and retention, enhancing improvements in dietary knowledge and habits. For instance, mobile applications can provide meal plans, dietary tracking, and instant feedback, simplifying the process of following healthy eating guidelines.

In addition, digital tools support continuous learning and motivation through features such as reminders, progress tracking, and notifications (Kumar et al., 2023). This sustained engagement plays a vital role in fostering long-term changes in dietary behaviour. Flaherty et al. (2021) found that regular interaction with digital health resources is associated with more consistent dietary improvements and increased motivation to maintain a healthy lifestyle.

Many digital platforms also integrate social features, such as peer support groups and online communities, which positively influence user attitudes (Friedman et al., 2022). These elements foster a sense of shared purpose and accountability, further supporting behavioural change. According to Meyerhoff et al. (2022), connecting with others undergoing similar health journeys provides emotional support and practical advice, strengthening positive outcomes.

From a public health perspective, digital interventions offer cost-effective, scalable solutions (Alsaqqa & Alwawi, 2023). Unlike conventional face-to-face programmes that may be limited by resources and reach, digital platforms can serve larger populations at lower costs. This is particularly important for reaching underserved communities that may lack consistent access to healthcare (Erku et al., 2023).

Digital tools are especially impactful in academic settings, where they can shape the dietary decisions of young adults. University students are in a critical phase of establishing lasting eating patterns (Chatterjee et al., 2021). Yun et al. (2018) note that digital interventions can equip students with the knowledge and skills to make healthier choices. By incorporating such tools into their routines, students are better prepared to manage dietary challenges and adopt sustainable eating habits (Ash et al., 2023).

In summary, digital interventions present a promising avenue for enhancing dietary knowledge, attitudes and practices. Their accessibility, adaptability, and interactive nature make them ideal for health promotion, particularly when integrated with faith-based frameworks like Halalan-Toyyiban.

Study Aim

This pilot study aims to evaluate the effectiveness of the Religious-Based Digital Intervention Tool (RB-DIT) in improving nutritional knowledge, attitudes, and dietary practices among university students. Specifically, it seeks to:

- Assess baseline levels of nutritional knowledge, attitudes, and practices
- Implement the RB-DIT intervention
- Measure post-intervention changes and collect user feedback

METHODOLOGY

Participants and Recruitment

The pilot study was conducted with 14 medical students. These individuals were chosen using a convenience sampling technique, where students volunteered to participate. The initial communication was established via email invitations and social networking platforms. Upon showing interest, the students received a comprehensive consent document that delineated the research's aims, methods, advantages, and ethical implications. This form guaranteed that the participants had a thorough understanding of their role in the study, and all individuals signed the document prior to commencement.

Development of the Digital Intervention Tool

The Religious-Based Digital Intervention Tool (RB-DIT) was developed to promote the Halalan-Toyyiban dietary concept through a user-friendly web-based application. It features educational content, interactive modules, and practical tools designed to enhance understanding and adherence to Halalan-Toyyiban principles. Development involved four key stages:

1. Expert Consultations: Seven experts in Islamic dietary law, nutrition, and digital education identified core components of the Halalan-Toyyiban concept.
2. Content Creation: Educational materials were developed based on these components, incorporating text, infographics, activities, and quizzes centred on holistic, balanced, wholesome, pure, quality, urf and individuality themes.
3. Tool Design: Daily self-paced modules were structured to include engaging content followed by interactive learning activities.
4. Pilot Testing: The RB-DIT underwent preliminary testing with a small group to identify and resolve usability issues prior to the main study.

Procedure for Intervention

The study began with a pre-intervention survey administered to all participants. This survey was designed to establish a baseline measure of their nutritional knowledge, attitudes, and dietary practices. To ensure convenience and ease of use, the survey was completed online by the participants.

Feedback Form

As part of the methodology, a structured feedback form comprising 11 items was administered to participants after the intervention to gather qualitative insights. The form was designed to assess user experience across key domains such as usability, content quality, engagement, and overall effectiveness of the RB-DIT. Collecting user feedback is a crucial component in evaluating digital health interventions, as it helps to understand participant satisfaction, identify areas for improvement, and enhance tool design for future use (Gowda et al., 2020). Feedback mechanisms also foster user engagement and support continuous improvement of digital tools by capturing real-time experiences and concerns (Ong et al., 2020). Furthermore, well-designed feedback systems contribute to quality improvement initiatives and have been shown to enhance both user satisfaction and intervention effectiveness (Brown et al., 2019).

Data Analysis

To evaluate the effectiveness of the RB-DIT, quantitative data were collected through pre-test and post-test surveys administered to participants before and after the intervention. Descriptive statistics were computed for each survey item to summarize participants' knowledge, attitudes, and dietary practices. These measures provided insights into central tendencies and variability across the domains assessed.

To determine whether the intervention had a statistically significant impact, paired t-tests were conducted to compare mean scores between the pre- and post-intervention phases. These tests help identify meaningful differences resulting from the intervention by evaluating whether observed changes are likely due to chance. Additionally, the paired t-test is a widely accepted method in health and behavioural research for evaluating the effectiveness of interventions, particularly in pre- and post-test designs, where it assesses whether observed changes are statistically significant within the same group over time (Daniels et al., 2024), (Ross & Willson, 2017), (Coman et al., 2013).

In addition to the quantitative analysis, qualitative data were gathered through a feedback form consisting of 11 items. This component was designed to capture participants' experiences with the RB-DIT, including perceived usability, content relevance, engagement, and overall satisfaction. These qualitative insights provided complementary evidence to better understand the contextual impact and user reception of the tool.

Ethical Considerations

This study was conducted in accordance with ethical guidelines and received approval from the relevant department. All participants provided informed consent and were assured of the confidentiality of their responses. Participation was voluntary, and students were free to withdraw from the study at any time without any repercussions.

RESULTS AND DISCUSSION

Reliability of RB-DIT

To confirm the RB-DIT's reliability in measuring changes in knowledge, attitude, and dietary practices related to the Halalan-Toyyiban dietary concept, a reliability analysis using Cronbach's Alpha was conducted on pre-test data collected before the intervention. Analysing pre-test responses allowed for an unbiased evaluation of the tool's internal consistency.

The RB-DIT includes 53 items across three domains: knowledge, attitude, and practices (KAP). The analysis returned a Cronbach's Alpha coefficient of 0.823, which is considered good reliability (George & Mallery, 2003, suggest that $\alpha > 0.80$ indicates good internal consistency). This result affirms that the instrument reliably measures related constructs and that responses were consistent (Table 1). High internal consistency is essential to ensure that post-intervention changes can be attributed to the intervention itself, not variability in the tool. These findings validate RB-DIT as a dependable instrument for evaluating religious-based dietary education.

Table 1: Reliability Statistic

Reliability Statistics	
Cronbach's Alpha	**N of Items**
0.823	53

Interpretation of Intervention for Knowledge Domain

A series of paired-sample t-tests assessed the impact of RB-DIT on knowledge related to the Halalan-Toyyiban dietary concept across 14 items (K1–K14). Ten items showed significant improvements ($p < .05$), particularly K7 and K14 (mean difference = 1.429, $p < .001$), indicating the tool's effectiveness in deepening understanding of these core topics. Some items such as K3, K4, K6 and K12 in the knowledge domain did not show significant improvement. This may be attributed to participants already possessing high baseline knowledge on these items, thus creating a ceiling effect. Additionally, the 10-day duration may have been insufficient for deeper behavioural or conceptual change in certain areas. Extending module time or incorporating reinforcement strategies could address this in future interventions. K12's p-value (.054) suggests potential significance with a larger sample or enhanced content delivery.

These outcomes echo findings from psychoeducation research that demonstrate improved understanding through structured content (Mehala, 2011; Tak et al., 2016). Tavakoli et al. (2016) also highlighted the positive effects of digital interventions on students' nutritional knowledge. Together, these studies reinforce the RB-DIT's value as a faith-integrated tool to enrich cognitive engagement with dietary principles.

Overall, the findings highlight the educational value and transformative potential of the Religious-Based Digital Intervention Tool (RB-DIT), affirming its effectiveness as a faith-integrated learning medium. Rather than merely transmitting information, the RB-DIT fosters meaningful understanding by aligning content with the learners' cultural and spiritual contexts. The positive progression observed across various knowledge dimensions reinforces the theoretical foundation of the intervention, demonstrating that the integration of religious principles within digital pedagogy can significantly enhance cognitive engagement and learning outcomes. These findings are consistent with previous studies, such as Amoore et al. (2023), who reported notable improvements in nutrition care knowledge among medical students following a structured nutrition education intervention, further validating the RB-DIT's impact on increasing dietary knowledge among university students (Table 2).

Table 2: Paired Sample T for Knowledge Domain

Paired Samples Test										
		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	K1_PSPost - K1_PSPre	.429	.514	.137	.132	.725	3.122	13	.004	.008
Pair 2	K2_PSPost - K2_PSPre	1.000	1.038	.277	.401	1.599	3.606	13	.002	.003
Pair 3	K3_PSPost - K3_PSPre	.143	.363	.097	-.067	.353	1.472	13	.082	.165
Pair 4	K4_PSPost - K4_PSPre	.214	.579	.155	-.120	.549	1.385	13	.095	.189

Pair 5	K5_PSPost - K5_PSPre	.714	.914	.244	.187	1.242	2.924	13	.006	.012
Pair 6	K6_PSPost - K6_PSPre	.143	.363	.097	-.067	.353	1.472	13	.082	.165
Pair 7	K7_PSPost - K7_PSPre	1.429	1.016	.272	.842	2.015	5.259	13	<.001	<.001
Pair 8	K8_PSPost - K8_PSPre	.929	1.141	.305	.270	1.587	3.045	13	.005	.009
Pair 9	K9_PSPost - K9_PSPre	.929	1.141	.305	.270	1.587	3.045	13	.005	.009
Pair 10	K10_PSPost - K10_PSPre	.786	1.122	.300	.138	1.433	2.621	13	.011	.021
Pair 11	K11_PSPost - K11_PSPre	.857	1.099	.294	.222	1.492	2.917	13	.006	.012
Pair 12	K12_PSPost - K12_PSPre	.429	.756	.202	-.008	.865	2.121	13	.027	.054
Pair 13	K13_PSPost - K13_PSPre	1.000	.784	.210	.547	1.453	4.770	13	<.001	<.001
Pair 14	K14_PSPost - K14_PSPre	1.429	1.089	.291	.800	2.058	4.907	13	<.001	<.001

Interpretation of Intervention for Attitude Domain

Pre- and post-intervention comparisons across 13 attitude items (A1–A13) revealed significant positive shifts in participants' perspectives. A1 showed the most substantial increase (mean difference = 1.000, $p < .001$), with A8, A10, and A11 also exhibiting strong gains ($p < .01$).

Moderate but meaningful improvements occurred in A3, A4, A5, A9, and A13 ($p < .05$). Items A2 and A6 reached marginal significance in one-tailed tests, while A7 and A12 showed no significant change, possibly due to pre-existing positive attitudes or the need for longer engagement. The paired samples t-test results, taken together, indicate that most of the items in the RB-DIT significantly improved students' attitudes toward the Halalan-Toyyiban dietary concept. The intervention has the potential to promote positive dietary attitudes among university students, as evidenced by the significant improvements seen in various attitude measures (Table 3).

The results demonstrate RB-DIT's effectiveness in fostering positive shifts in dietary attitudes. This aligns with Ramadas et al. (2018), who found that digital dietary education improved attitudes among diabetic patients. Similarly, Gholandoz & Sardary (2020) showed that interventions incorporating religious values helped reduce high-risk behaviors. These studies support the role of culturally rooted educational tools in shaping sustainable attitudes

Table 3: Paired Sample T for Attitude Domain

Paired Samples Test										
		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	A1_PSPost - A1_PSPre	1.000	.679	.182	.608	1.392	5.508	13	<.001	<.001

Pair 2	A2_PSPost - A2_PSPre	.429	.756	.202	-.008	.865	2.121	13	.027	.054
Pair 3	A3_PSPost - A3_PSPre	.286	.469	.125	.015	.556	2.280	13	.020	.040
Pair 4	A4_PSPost - A4_PSPre	.429	.514	.137	.132	.725	3.122	13	.004	.008
Pair 5	A5_PSPost - A5_PSPre	.500	.650	.174	.124	.876	2.876	13	.006	.013
Pair 6	A6_PSPost - A6_PSPre	.214	.426	.114	-.032	.460	1.883	13	.041	.082
Pair 7	A7_PSPost - A7_PSPre	.071	.475	.127	-.203	.345	.563	13	.291	.583
Pair 8	A8_PSPost - A8_PSPre	.571	.514	.137	.275	.868	4.163	13	<.001	.001
Pair 9	A9_PSPost - A9_PSPre	.500	.650	.174	.124	.876	2.876	13	.006	.013
Pair 10	A10_PSPost - A10_PSPre	.571	.646	.173	.198	.945	3.309	13	.003	.006
Pair 11	A11_PSPost - A11_PSPre	.500	.519	.139	.200	.800	3.606	13	.002	.003
Pair 12	A12_PSPost - A12_PSPre	.286	.825	.221	-.191	.762	1.295	13	.109	.218
Pair 13	A13_PSPost - A13_PSPre	.571	.852	.228	.080	1.063	2.511	13	.013	.026

Interpretation of Intervention for Practices Domain

Twenty-six practice items (P1–P26) were evaluated through paired-sample t-tests. Several items exhibited statistically significant gains, especially P5 and P6 ($p < .001$), and P11 (mean difference = .929, $t = 13.000$, $p < .001$), highlighting strong behavioural shifts. Other significantly improved practices included P1, P13, P14, and P15. Items P20 and P21 approached significance, indicating a positive trend. Items with non-significant changes (e.g., P2, P4, P8, P12, P23) may reflect pre-existing practices or challenges in changing ingrained habits during a short intervention period.

Overall, several items within the practices domain revealed statistically significant improvements post-intervention, suggesting a meaningful shift in dietary practices following engagement with the RB-DIT. These findings show RB-DIT's potential in promoting healthier practices. However, the variability across items underscores the complexity of behaviour change, which is influenced by individual habits, access, and social context. Enhancing the tool with peer interaction, reflective exercises, or follow-up reminders may boost long-term impact (Diefenbacher et al., 2022).

Table 4: Paired Sample T for Practices Domain

Paired Samples Test										
		Paired Differences					t	df	Significance	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				One-Sided p	Two-Sided p
					Lower	Upper				
Pair 1	P1_PSPost - P1_PSPre	.500	.519	.139	.200	.800	3.606	13	.002	.003

Pair 2	P2_PSPost - P2_PSPre	.071	.475	.127	-.203	.345	.563	13	.291	.583
Pair 4	P4_PSPost - P4_PSPre	.357	1.151	.308	-.307	1.022	1.161	13	.133	.266
Pair 5	P5_PSPost - P5_PSPre	.857	.363	.097	.647	1.067	8.832	13	<.001	<.001
Pair 6	P6_PSPost - P6_PSPre	.786	.426	.114	.540	1.032	6.904	13	<.001	<.001
Pair 7	P7_PSPost - P7_PSPre	.286	.726	.194	-.134	.705	1.472	13	.082	.165
Pair 8	P8_PSPost - P8_PSPre	.214	1.188	.318	-.472	.900	.675	13	.256	.512
Pair 11	P11_PSPost - P11_PSPre	.929	.267	.071	.774	1.083	13.000	13	<.001	<.001
Pair 12	P12_PSPost - P12_PSPre	.214	.802	.214	-.249	.677	1.000	13	.168	.336
Pair 13	P13_PSPost - P13_PSPre	.357	.497	.133	.070	.644	2.687	13	.009	.019
Pair 14	P14_PSPost - P14_PSPre	.714	.825	.221	.238	1.191	3.238	13	.003	.006
Pair 15	P15_PSPost - P15_PSPre	.571	.514	.137	.275	.868	4.163	13	<.001	.001
Pair 16	P16_PSPost - P16_PSPre	.143	.663	.177	-.240	.526	.806	13	.217	.435
Pair 17	P17_PSPost - P17_PSPre	.143	.770	.206	-.302	.588	.694	13	.250	.500
Pair 18	P18_PSPost - P18_PSPre	.143	.864	.231	-.356	.642	.618	13	.274	.547
Pair 19	P19_PSPost - P19_PSPre	.500	1.160	.310	-.170	1.170	1.612	13	.065	.131
Pair 20	P20_PSPost - P20_PSPre	.571	1.016	.272	-.015	1.158	2.104	13	.028	.055
Pair 21	P21_PSPost - P21_PSPre	.429	.756	.202	-.008	.865	2.121	13	.027	.054
Pair 22	P22_PSPost - P22_PSPre	.357	.745	.199	-.073	.787	1.794	13	.048	.096
Pair 23	P23_PSPost - P23_PSPre	.071	.917	.245	-.458	.601	.291	13	.388	.775
Pair 24	P24_PSPost - P24_PSPre	.357	1.151	.308	-.307	1.022	1.161	13	.133	.266
Pair 25	P25_PSPost - P25_PSPre	.500	.519	.139	.200	.800	3.606	13	.002	.003
Pair 26	P26_PSPost - P26_PSPre	.000	.679	.182	-.392	.392	.000	13	.500	1.000

User Feedback on the RB-DIT

A thematic analysis of open-ended responses yielded three primary themes: (i) a strong sense of spiritual connection and appreciation for integrating Islamic values into dietary learning; (ii) high user engagement, particularly due to the practical and interactive nature of the modules; and (iii) constructive suggestions for improvement, including extending the module duration and adding real-life case studies to further contextualise the content.

Post-intervention feedback from participants using a 4-point Likert scale (11 items) indicated high satisfaction. Scores ranged from 3.36 to 3.93, with the highest ratings for perceived learning (Item 10) and technical reliability (Item 11). Content clarity and organization also received strong approval (Table 5)

The lowest score was for Item 4 (minimal duplication; M = 3.36), suggesting a need to streamline repetitive content. Nonetheless, overall responses validated the RB-DIT's structure, engagement level, and educational value.

These results provide supporting evidence that the RB-DIT is a well-structured, content-rich, and technically reliable digital tool for delivering religious-based nutrition education. User responses affirmed the effectiveness of the modules in promoting KAP acquisition, particularly in relation to the Halalan-Toyyiban dietary principles. Minor adjustments may be considered to streamline content presentation and further enhance user experience. As demonstrated in Ambali & Bakar (2014) and Nundloll & Ramachandiran (2020), religious alignment enhances intervention relevance and efficacy.

Table 5: Analysis of Mean Scores and Standard Deviations for User Feedback

	Item Statistics			
No	**Item**	**Mean**	**Std. Deviation**	**N**
1.	Modules are well-organised and easy to understand	3.79	.426	14
2.	Modules are sequenced in a logical order	3.71	.469	14
3.	Module materials are consistent in structure and design.	3.79	.426	14
4.	Minimal duplication of information	3.36	.497	14
5.	Pages are visually consistent throughout the modules	3.79	.426	14
6.	The order of topics in the modules are logical.	3.71	.469	14
7.	Accuracies of information in the modules.	3.64	.497	14
8.	Content relevant and appropriate	3.79	.426	14
9.	The relation of the content for the modules to the topic is well understood	3.86	.363	14
10.	Do you think by doing these modules you know better about Halalan-Toyyiban?	3.93	.267	14
11.	Minimal technical issues when using the modules	3.93	.267	14

CONCLUSION

In conclusion, the RB-DIT has demonstrated significant potential in improving the dietary knowledge, attitudes, and practices of university students. The positive outcomes observed in this pilot study suggest that religious-based digital interventions can be a valuable tool in promoting healthier dietary behaviours, thereby contributing to better health outcomes among the target population. However, as this was a small-scale pilot involving only 14 participants, the findings should be interpreted with caution. Broader implementation and further validation through larger and more diverse samples are recommended. The integration of religious principles with digital education represents a promising approach that warrants further exploration and development in future health promotion efforts. The significant attitudinal improvements observed in the intervention group are consistent with earlier findings that religious framing can enhance personal motivation and perceived relevance of health behaviours (Hashim & Abdul Halim, 2023; Ali & Ushakov, 2020).

The effectiveness of the RB-DIT intervention was further confirmed by effect size calculations. The Cohen's d values for knowledge (d = 1.92), attitude (d = 1.41), and practice (d = 0.70) indicate large effects for knowledge and attitude domains and a medium-to-large effect for dietary practices (Table 4). This reinforces that the observed improvements were not only statistically significant but also practically meaningful in real-world terms.

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CONFLICT OF INTEREST

The author declares no conflict of interest. The research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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