Development of a Smartphone Application for Pregnant Women with Gestational Diabetes Mellitus

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Background

Although the previous mobile health based clinical trials showed promising findings for glycemic control among women with GDM; however, none of the previous applications incorporated motivational strategies and none of them included comprehensive tracking of self-care measures. This study aimed to document the process of developing, and testing the feasibility and acceptability of a novel smartphone application for women with GDM.

Objectives

This study aimed to document the process of developing, and testing the feasibility and acceptability of a novel smartphone application for women with GDM.

Methods

This pilot clinical trial was conducted between May and June 2021 on the antenatal care clinic at Sultan Qaboos University Hospital (SQUH), Oman. Fifteen Arabic-speaking pregnant women with GDM were selected randomly and they were provided access to use the application for 4 weeks. A smartphone application for women with GDM was developed to promote adherence to self-care activities such as weight control, Self- Monitoring of Blood Glucose, following a healthy diet, and regular physical activities. The application also included self-efficacy enhancing strategies such as goal setting, role modeling, motivational messages, mastery of experiences, and tracking healthy behaviors. Following development of the application, this single-arm pilot clinical trial included 15 pregnant women with GDM. The participants were selected randomly and they were provided access to use the application for 4 weeks. Feasibility outcomes of the application assessed were success rate of transmitting motivational text messages, and rate of participants acknowledging recipient of text messages. Acceptability outcomes of the application were determined by asking open-ended questions through telephone interview at 4-week post-intervention.

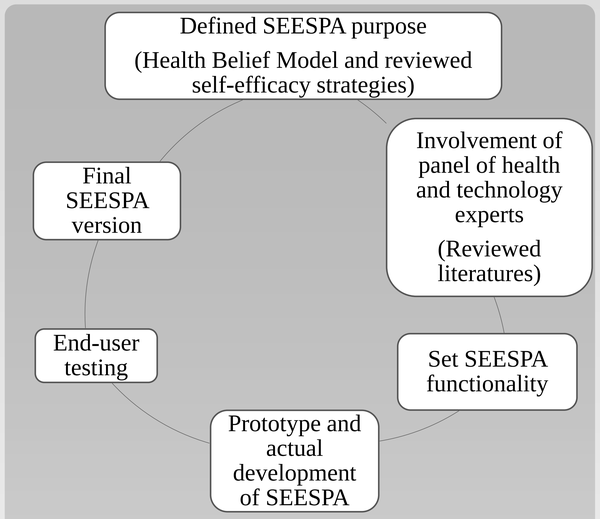

Figure 1. Development Process of SEESPA

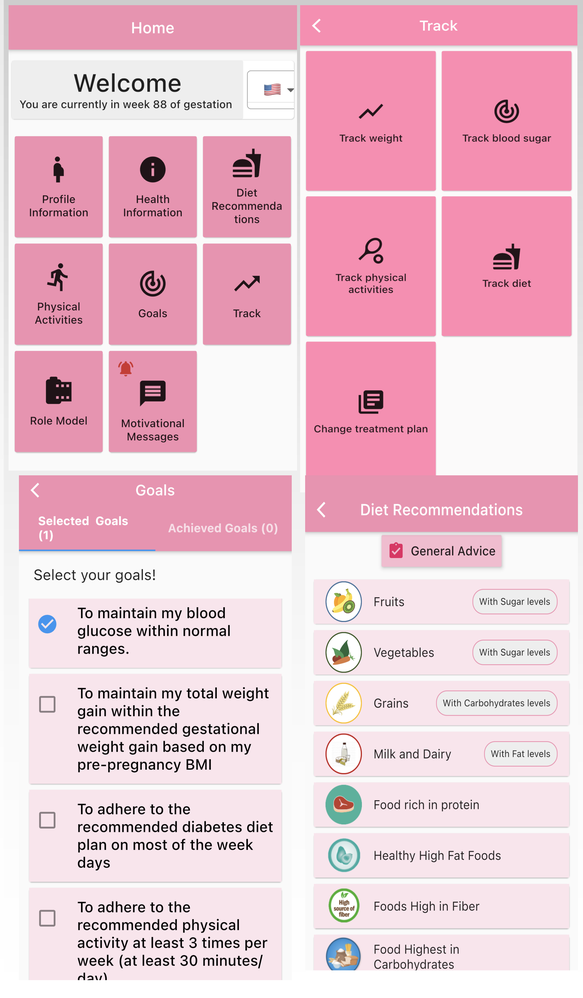

Figure 2. Screenshots of SEESPA

Results

100% (n = 15) of the invited women consented to participate, with a 60.0% (n = 9) of retention rate at post-trial intervention. Two motivational text messages were sent to all participants on a weekly basis, of which 49 (68.06%) were acknowledged by the participants. At post-trial intervention, the study participants reported that the application is useful, and they felt satisfied about it. The majority of the participants accessed the app between two (n = 3, 33.3%) and four times (n = 3, 33.3%) per week. Six out of the nine women rated the effectiveness of the app 8 and above on improving women's self-care activities using a rating scale from 0 to 10. Further, the majority of the participants appreciated that the app has thorough health information on GDM, tips on diet selection, safe physical activity, and is easy to use, thus providing a novel, comprehensive tool for GDM self-care management. The participants further appreciated the motivational text messages and role model video as motivational factors to use the app. Participants brought the following suggestions to improve the app: incorporating complete meal suggestions in the diet section, synchronizing the app to glucometer and step-counts apps, giving the ability to share the recorded data to the primary physician, and give immediate suggestions to improve blood sugar level if it is too high or too low.

Table 1. Key Sections of SEESPA

Section	Purpose
GDM health education	Promote knowledge about GDM.
Diet recommendation	Promote knowledge and competence to select the appropriate diet to control the BS level.
Physical activity	To promote competence to choose the appropriate and safe physical activity during pregnancy.
Goals	To motivate the user to achieve the selected goal.
Tracking behaviors	To record and keep track of self-care behaviors.
Role Model	To motivate the user to manage the barriers and challenges.
Motivational Messages	To motivate the user to adhere to the recommended healthy behaviors.

Conclusions

The developed innovative smartphone application is both clinically feasible and acceptable to be used by pregnant women with GDM. In the next phase, we are planning to conduct an RCT to compare the effectiveness of this smartphone application with the traditional health education and the standard prenatal care (control) provided for women with GDM. Findings from the RCT is expected to inform the health policymakers to integrate this application with the antenatal health care practice of women with GDM, specifically in developing countries where there is a greater risk of developing maternal and neonatal GDM- related complications.

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