Use of Infertility Handling Among Women of Reproductive Age

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Abstract. Our primary objective was to develop a mobile application for monitoring the changes of menstrual cycle for clinical treatment planning. Participating woman can use the application called "Infertility Handling", which will be soon available from Google Play Store for general public. This Android-based application provides basic biological and physiological information to women using the application at different stages of the cycle. They will receive useful help and advice concerning their health. The application provides also quick and convenient information gathering for short and long-term management of patient's treatment and excellent tool for the personal medical monitoring. In this paper we present a short summary of the developed application.

Keywords: Menstrual cycle · Monitoring · Android · Basal body temperature

1 Introduction

Telemedicine programs offer potential low-cost and quick solutions for management of several diseases, but infertility. The diagnosis is settled when a couple fail to achieve a successful pregnancy after 6–12 months of regular unprotected sexual intercourse [1]. However fertility can be reduced in both men and women, the diagnosis is usually valid for a couple, and sometimes for a person. The incidence is approximately 15% [2].

The female reproductive system is far more complicated than that in males. Focusing on female infertility, one of the most common causes is ovulatory dysfunction. It might be identified in approximately 15% of all infertile couples and accounts for up to 40% of infertility in women. The most common causes of ovulatory dysfunction include polycystic ovary syndrome, obesity, weight gain or loss, thyroid dysfunction, and hyperprolactinemia. However, the exact cause of ovulatory dysfunction often remains unclear. Basal body temperature (BBT) measurements provide a simple and low cost method for evaluating ovulatory function. If the menstrual cycle is monitored with BBT, it is clear that the period of highest fertility span is the mid-cycle rise in BBT. Healthy ovulatory cycles generally are associated with clearly biphasic BBT recordings and anovulatory cycles typically result in monophasic patterns [3, 4].

The aim of our study was to monitor and document biphasic BBT and menstrual pattern with mobile phone application among women, in particular among women having irregular cycles and infertility problems. We intend to use this information for successful infertility treatment planning.

2   Materials and Methods

A mobile application was developed to monitor the menstrual cycle of reproductive aged women. It relies on the smartphone's own calendar. After registration, women participating in our study can download the "Infertility handling" mobile phone application from Google Play Store. For each day patients may assign body weight, basal body temperature, medication, complaints, examinations and comments. They can also record the date and duration of menstrual bleeding. On the basis of the recorded information (beginning of menstrual cycle, basal body temperature) the application will predict the potentially best time for a successful fertilization. It may also calculate the first day of the next bleeding, of course (Figs. 1, 2 and 3).

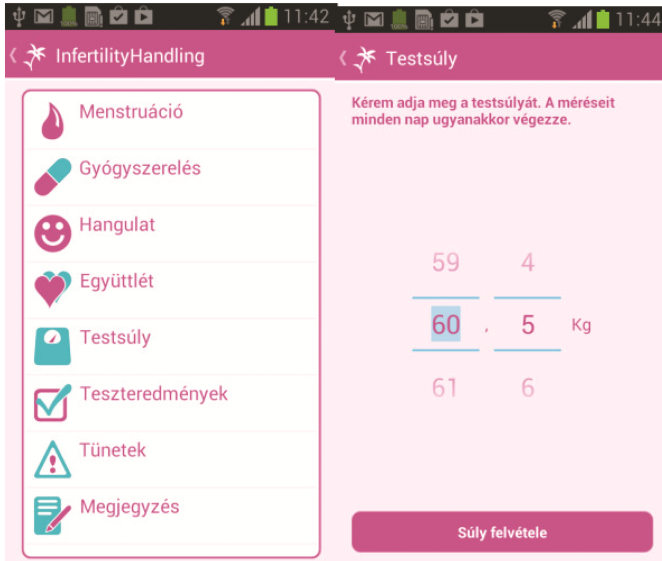**Fig. 1.**   Design of the "Infertility Handling" application

Fig. 2. Management of the events related to BBT measurements
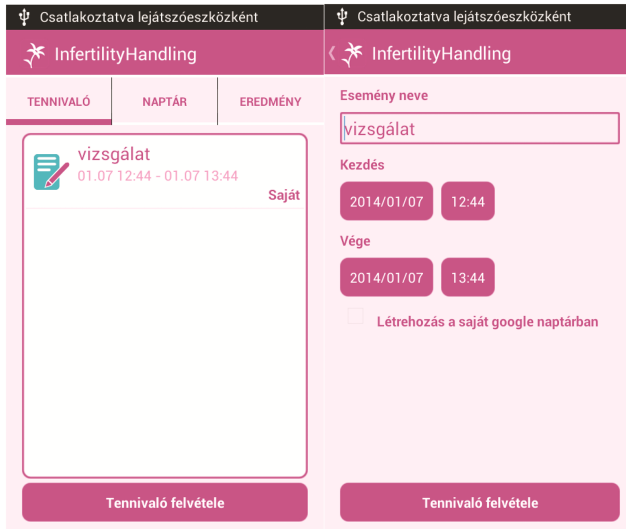

Fig. 3. Usage of the diary function to ask for appointment

3   Discussion

There are many mobile applications (50+) targeting women health, in particular menstrual cycle. Though there are subtle difference in the business model and graphical design, the basic functions of these applications are almost the same:

- logging the dates and calculating the average of past months' menstrual cycles to predict the start date of the next period
- showing the current and future period dates, ovulation and fertile days
- tracking sex, pain, moods, cervical fluid, birth control pills
- passcode to protect privacy

We note that majority of the applications are free to use, while medical services offered as extra functionality are to be payed.

The competitiveness of the most popular applications comes from their unique functions and design. The "Period Tracker - My Calendar" with 50.000.000+ downloads uses Google account data backup and restoration, and body temperature chart to determine ovulation date. The "Period Tracker" uses flowers that show up on the home screen during the predicted ovulation and eight day "fertile window." The "Glow" has a fertility treatment support for IVF or IUI patients, and partnership with leading fertility clinics. The "WomanLog" helps the user to self-exam breast and carry out ovulation test.

Assisting communication between users and gynaecologists still offers opportunity to create new solutions. Our competitive advantage is the high quality medical and IT support through telemedicine services.

4   Conclusion

So far the developed Android application has been tested by 8 healthy reproductive aged women, each of them with difference in cycle patterns. By the 4th month the application could determine the first day of the next bleeding precisely, relying on the temperature curve and personal changes in weight, mood and other complaints. We note that none of the women became pregnant, because pregnancy was not their intention. Our present aim is to continue tests with larger population, including women who have irregular cycles and/or take part in infertility programs.

An advantage of our application is that medical assistance can easily and quickly identify personal characteristics of the hormonal cycle or bleeding abnormalities. Therapies can be more patient-centered and doctors may assign pause or continuation of one or more medications via e.g. text messages. Assisting communication between users and gynaecologists by a mobile application can reduce the queue in front of the outpatient care unit and make the therapy more comfortable. For researchers this programme may provide a huge database to find out new trends in the background of reducing fertility and establish new medications and policy for women.

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