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Android Application Development for Calculating Basal Metabolic Rate and Daily Caloric Requirements Using Harris Benedict Formula

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Abstract: Health is very important for human life. Fulfilling the nutritional requirements on a healthy and regular basis is fundamental for body health. The energy amount that human body needs in order to maintain its vital activities during resting is called basal metabolic rate. The formula which was developed by Harris and Benedict in 1919 in order to calculate basal metabolic rate still yields results most similar to the values calculated via calorimeter. In this study, a mobile application was developed in an attempt to calculate basal metabolic rate using Harris Benedict formula and to determine the daily caloric requirements of a person through this rate. This mobile application can be used in devices with Android OS. In the future studies, it is planned to extend the scope of the mobile application so as to include different nutritional studies, and to improve the structure of the application so as to suggest daily meals after evaluating the calculated caloric need with the data obtained from the user.

Keywords: Android, Application Development, Balanced Nutrition, Basal Metabolic Rate, Harris Benedict Formula

I. INTRODUCTION

Health is very important to continue human life and to maintain life quality. Keeping healthy is possible with a health-conscious attitude. One of the fundamentals of health can be described as adequate and balanced nutrition [1]. Nutrition is not an action where a person can eat anything at any time or that can be made in order to suppress hunger. Nutrition can be described as taking nourishment, which a person needs in order to maintain physical development and to keep a healthy life, in an adequate and required amount and using it within the body. This action is imperative for any person who aims to maintain a healthy life [2].

As healthy and balanced nutrition is a vital criterion for human health, calculating the required nutrition amount for human body is very important. The energy amount that human body needs in order to maintain its vital functions while resting is called basal metabolic rate [3]. This amount constitutes a part of the daily caloric need of a person, and only involves the respiratory system & circulatory system activities. The required daily total energy amount is calculated in calories by making various levels of addition to the basal metabolic rate in accordance with the daily physical activity rate of a person [4].

II. HARRIS BENEDICT FORMULA

Harris Benedict formula was developed by James Arthur Harris and Francis Gano Benedict in 1919 for the purpose of calculating basal metabolic rate. The equations of these two researchers, who named the formula after themselves, yield results most similar to the values calculated via calorimeter which are still valid after almost a century. There are 4 main criteria in the calculation. These criteria are gender, age, height and weight.

The basal metabolic rate formulas which were developed by Harris and Benedict have two types based on gender variable [5],[6].

Males:

66.5 + (13.7x Weight in kg) + (5.0 x Height in cm) - (6.8 x age in Yrs.)

Females:

655 + (9.6 x Weight in kg) + (1.8 x Height in cm) - (4.7 x age in Yrs.)

With basal metabolic rate, the recommended daily nutritional calorie intake of a person can be calculated. While this amount may vary according to individual differences, the current health status and daily activity criteria of the person must be taken into consideration during calculation. The formula used for calculating the caloric requirements can be shown as follows [7].

Caloric Requirements = BMR[1] x Injury Factor[2] x Activity Factor[3]

[1] Basal Metabolic Rate: Calculate with Harris Benedict Formula

[2] Injury Factors:

1.0 – Normal
1.2 - Long Bone Fracture
1.1 - Burn Post Graft
1.3 - COPD
1.4 - Severe Head Injury
1.5 - 10%-49% Burns
1.4 - Cancer
1.5 - Major Surgery
1.6 - Acute Sepsis
2.0 - >50% Burn

*[3] Activity Factor:**1.1** for each °C > 37°C Body Temperature [7]*

In order to calculate basal metabolic rate and to determine the daily caloric requirements, an application which can be used in Android OS, one of the commonly used mobile operating systems, was developed. With this application, users will be able to calculate their basal metabolic rate at any time through the values they assign to the variables, and organize their nutritional plans by learning their daily caloric need. Moreover, the aim is to enable them to conduct this process through mobile devices which we frequently use in our daily life.

III. APPLICATION DEVELOPMENT

In this study, a mobile application was developed in an attempt to calculate basal metabolic rate and to determine the daily caloric need of a person through Android Studio [8]. The application uses the following information as the data of the user.

The screenshot of the application is shown in Fig. 1.

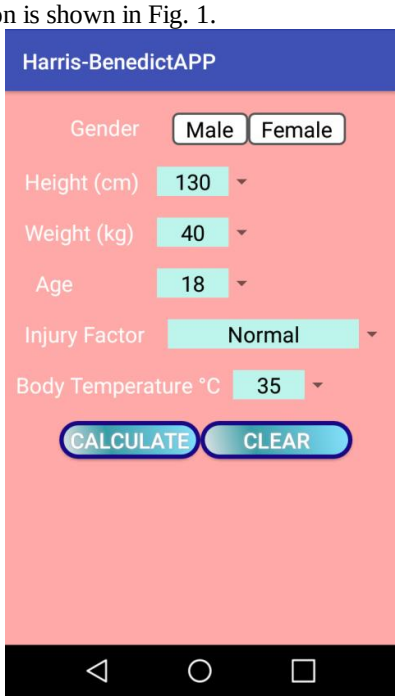

Fig.1 The screenshot of the application

Example calculation screenshots are shown in Fig.2 and Fig.3.

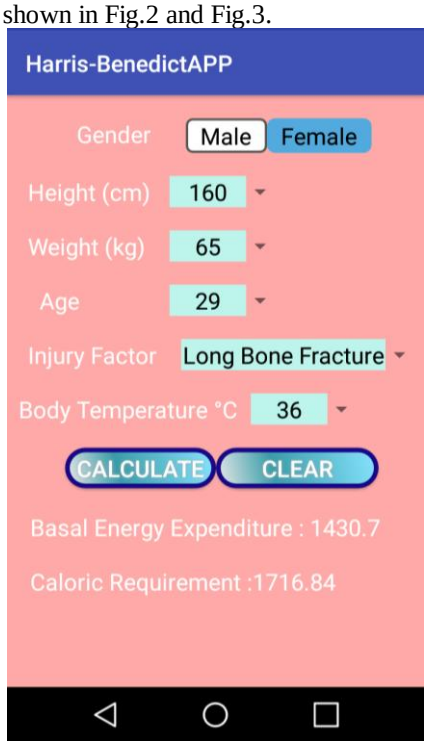

Fig.2 Example calculation screenshot of a female

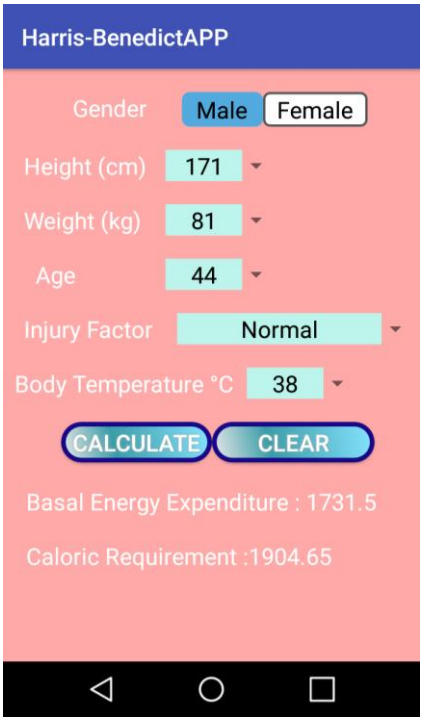

Figure-3: Example calculation screenshot of a male

The setup (.apk) file of the application can be downloaded from http://www.erkanyesil.com/hba.rar and used in mobile devices with Android OS.

IV. CONCLUSION

In the application developed within the scope of this study, the aim is to calculate basal metabolic rate and to determine the daily caloric need of human body through this rate. In the future studies, it is planned to improve the application in the following way:

- Including different nutritional calculators in addition to Harris Benedict formula
- Enabling the application to plan a personalized daily menu considering the nutritional preferences of the user
- Recording the user values, and enabling the user to display and compare recent basal metabolic rates at any time

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