A New Protocol Test For Physical Activity Research In Obese Children (Etiobe Project)

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Abstract. A new protocol is presented to validate TIPS (portable physiological monitoring device designed by I3BH that can get respiration, ecg and activity of the patient) for physical habits detection. Physiological and activity parameters and data from questionnaires have been acquired from a group of obese & non-obese children (n=20). Children completed activities from sedentary level to vigorous level. Preliminary results show variability on the response of children’s effort and feasibility of TIPS platform as an ambulatory tool.

Keywords. Children Obesity, Physical Activity Detection, E-therapy, Wireless Monitoring

Introduction

TIN (Therapy Intelligent Network) is an open platform that tries to establish a sensor network where the focus is the patient, which captures information in real time, is so much of physiological-like contextual data. In this first phase, TIPS shows the personal platform (Personal Therapy Intelligent Sensor) that the patient will carry. This tool will be validated with a protocol test. The objectives of this work are:

• Research about predominant factors for estimating Energy Expenditure in obese children
• Facilitate physicians & psychologists with a new evaluation tool for the treatment
• Validate a new ambulatory tool for the detection of physical activity habits.

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1. Method

After analyzing certain studies and articles applied to physical activity estimation [1-3] has been designed a proprietary protocol. It has been correlated the activity registered at the TIPS with a portable indirect calorimeter (FITMATE PRO) that measures the O2 consumption during the physical activity [4,5].

It has been designed as a clinic protocol for testing TIPS in obese children:
• Two groups (non obese & obese group) of 20 children (male/female subjects 10±4 years).
• First phase, the patient is measured lyed during 20 minutes to get the resting metabolic rate
• Afterwards, patient must complete 8 activity stages during 45 minutes from sedentary level to vigorous level.
• During the protocol Respiration Rate, RR interval, Accelerometer against O2 consumption is measured. All the signals are synchronized for their processing stage.
• Questionnaires for detecting physical activity (3-Day Physical Activity Recall; 3DPAR), diet habits (a food frequency questionnaire), and ergonomy are completed at the end by the child.
• A Statistical ANOVA 2x2 (obese x non obese vs. high x low energy expenditure) analysis will be done in order to analyze the data.

2. Results

The preliminary results show two first conclusions:
1. A variability on the response of children’s effort. The necessities of developed algorithms take variability into account. The combination model (Heart Rate+ Accelerometer) seems to have the strongest relation to Physical Activity Energy Expenditure. At sedentary stages, accelerometer overestimates energy consumption. At moderate and vigorous stages, the physiological response is a key point because it reflects the aerobic effort of the patient. The variability at this relation depends on the fitness and healthy level of the patient, a key point at the obese therapy.
2. *The feasibility of TIPS platform as an ambulatory tool.* The protocol showed good acceptability between children, and users reported that it was not aversively difficult. This factor is fundamental in order to know that the measures are stable and the children are able to stay with them for long time periods.

3. Discussion

Our first hypothesis:
- It is necessary to develop an exclusive estimation technique for the obese child population and assign special weight for each anthropometric, physiological, and movement parameter.
- It is necessary to have a direct measuring of the resting metabolic rate for a good evaluation.
- A good measuring of physical activity is important in order to prescribe the best physical activity tasks.
- A new protocol test using a standard effort-test (Bruce Protocol) must be made to compare this study with other children tests.

References