BigO: The use of novel technologies for the management of childhood obesity – A clinical pilot study

Athanasia Tragomalou 1,2, Penio Kassari 1,2, Ioannis Ioakeimidis 3, Konstantinos Filis 4, Eleni Theodoropoulou 4, Giorgos Lymeropoulos 4, Isabel Perez Cuevas 5, Youla Karavidopoulou 6, Christos Diou 7, Christos Maramis 6, Eirini Lekka 6, Nicos Maglaveras 6, Anastasios Delopoulos 7, Evangelia Charmandari 1,2

1. Division of Endocrinology and Metabolism, Center of Clinical, Experimental Surgery and Translational Research, Biomedical Research Foundation of the Academy of Athens, Athens, Greece
2. Out-patient Clinic for the Prevention and Management of Overweight and Obesity, First Department of Pediatrics, National and Kapodistrian University of Athens Medical School, “Aghia Sophia” Children’s Hospital, Athens, Greece
3. 3rd Department of Radiology, Hospital Unit of Children’s Hospital “Aghia Sophia”, Athens, Greece
4. Cosmote Mobile Telecommunications SA, Athens, Greece; 5. MySphera, Valencia, Spain
6. Medical School, Aristotle University of Thessaloniki, Thessaloniki, Greece
7. Department of Electrical and Computer Engineering, Aristotle University of Thessaloniki, Thessaloniki, Greece

Background: Obesity represents one of the most challenging public health problems of the 21st century. According to the World Health Organization (WHO), there is a need to create reliable monitoring and behavioral systems, and to investigate their effectiveness in preventing childhood obesity.

Objective: To evaluate a range of novel technologies for collecting photographs, information regarding physical activity and geographic data (GPS) in overweight and obese children and adolescents during their day-to-day life.

Methodology: The study was carried out as part of the four-year European project BigO (http://bigoprogram.eu, Horizon2020, No. 727688). Overweight and obese children and adolescents aged 9-18 years participated in the study following approval by the local Committee on the Ethics of Human Research. Written informed consent was obtained by parents/guardians in all cases. The data collection system includes the BigO technology platform, which interfaces with a Smartphone and Smartwatch, and records data objectively (using inertial sensors and GPS) for each patient. Data are then transmitted to BigO servers to extract behavioral indicators, including: (a) physical activity/exercise, (b) dietary habits, and (c) environmental conditions (urban, socio-economic, nutritional). During the first pilot phase, participants used the BigO system for 2 weeks to take photographs of the food they consumed, as well as food advertisements, and wore the watch for specific periods during the week (at least 2 weekdays, 1 weekend and 3 nights). Finally, they were asked to return the watch and complete a questionnaire.

Results: Forty children and adolescents aged 9-18 years (11 males, mean BMI ± SD: 29.94 ± 3.32 kg/m²; 29 females, mean BMI ± SD 30.86 ± 3.69 kg/m²) participated in the study. All subjects uploaded a total of 571 meal photographs from their mobile camera and recorded 177 days of inertial sensor data from the smartwatch (accelerometer). Seventy-seven percent of the participants expressed a positive or neutral opinion when assessing the system.

Conclusions: These novel tools and interventions record the behavior of overweight and obese children and adolescents in an objective way and provide information about their environment. Therefore, they may be useful at designing new public health policies and strategies in order to effectively address childhood obesity.

The authors have no financial relationship(s) to disclose relevant to this presentation

This work was funded by the European Community’s Health, demographic change and well-being Program under Grant Agreement No. 727688, 01/12/2016 - 30/11/2020