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Can Activity Monitoring and Connected Health Increase Physical Activity in Patients with Obesity? A Pilot Study

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Purpose

Increasing physical activity is associated with better weight control, reduced all-cause mortality, cardiovascular disease incidence, and the incidence of type 2 diabetes. Although the government and health organizations recommend at least 150 minutes of moderate-intensity physical activity per week, half of the population does not reach the goal, and about one-third of the population completes no moderate-vigorous physical activity. This is associated with a critical public health threat of obesity epidemic in the US. Wearable technology of activity monitoring and a connected health platform have the potential to improve adherence to the recommended amount of physical activity. The purpose of the study was to test the feasibility of connected health with wearable activity monitoring to improve the amount of physical activity as well as body composition in patients with obesity.

Methods

Nineteen adults (18 to 59 years, 4 males and 15 females) with a BMI=30–40kg/m² were enrolled. All subjects received a Fitbit Flex2 activity monitor and Polar H10 Heart Rate monitor. Bluetooth technology downloaded activity data to a smartphone with the 24alife software. Subjects were randomized to a Connected Health (CH) group or Self-Monitoring (SM) group. The Connected Health intervention consisted of 2 in-person exercise consultations (week 1 and 4) plus 6 follow-up telephone calls, once between the in-person consultations and 5 calls thereafter, with individualized instruction. The Self-Monitoring group monitored activity and exercise using wearable devices without any individualized follow-up instruction/consultation. The goal was to achieve 8,000 steps/day and exercise with the HR monitor at least twice weekly (60-90 minutes/week of moderate intensity exercise) for the initial 4 weeks, and increase to 10, 000 steps/day and 150 minutes/week of moderate intensity exercise thereafter. Subjects were followed up for 24 weeks and scheduled to come back to get outcome measures including their weight, waist circumference, and body fat percentage (%) at 12 and 24 weeks.

Results

The attrition rate at 24 weeks was 44% in CH group (4 of 9 withdrew), and 60% in SM group (6 of 10 withdrew). Withdrawn patients had lower adherence and exercise minutes per week during the initial 4 weeks.

Daily step count over 24 weeks was higher in CH group compared to SM group (9706 steps (95% CI: 9228–10185) vs 7650 steps (95% CI: 7169–8131), p<0.001) by a longitudinal mixed-effect model. The step count

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at day 1 was not different between the groups (8564 vs 8096, p=0.308), but showed significant difference as time goes (9883 vs 7581, p<0.001 at day 84; 11218 vs 7061, p<0.001 at day 168).

Weekly minutes of structured exercise over 24 weeks were 90 min (95% CI: 36–144) in CH group and 84 min (95% CI: 31–136) in SM group (p=0.863). Exercise minutes gradually decreased by time in both groups, and there was no significant difference at each time-point between the groups (127 min vs 120 min, p=0.903 at 1st week; 87 min vs 81 min, p=0.865 at 12th week; 44 min vs 39 min, p=0.934 at 24th week).

Changes in weight, waist circumference, and body fat % at 24 weeks in CH group vs SM group were -2.1 (-9, -1) kg vs -1.9 (-3, 0) kg, +0.8 (-9, 4) cm vs +3.1 (-1, 8) cm, and -3.6 (-4, 0) % vs -1 (-2, 0) %, respectively (presented as median with interquartile range).

Conclusions

The patients who received Connected Health intervention achieved more daily steps compared to Self-Monitoring alone, while there was no significant difference in the minutes of structured exercise between the groups. Changes in weight, waist circumference, and body fat % had large variability. High attrition rate and the small sample size were the limitations of the study. Based on the results of this pilot study, we can propose to set up a screening period for early adherence before randomization and to make the activity/exercise monitoring system more simple to minimize technical issues in the future clinical study.