Case Report | **Open Access**

Self-Experiencing "The Healthiest Weight"

Author: VIRTUAL PERSONAL TRAINER - www.virtual-personaltrainer.com
Contact: info@virtual-personaltrainer.com

Abstract

The Ideal Weight has been an interesting topic for years. The Healthiest Weight should be accurate and unique for everyone. Current methods use the BMI (Body Mass Index) as an indicator of a person's optimal weight. However, BMI has some issues, leading to inefficient weight management programs. Successful programs should consider the optimal timing for the brain control of weight-presetting, the fundamental of the Lipostat theory, not yet reported in humans. In this study, the bases for successful Weight Management Programs are proposed by BMI sub-categorization, current state-of-the-art mobile technology and self-experimentation. This is the first reported long-term human self-experiment involving successful weight loss, metabolic adaptation and weight-presetting, consistent with the Lipostat theory. New concepts and ideas are raised, setting up the bases for further experimental investigations.

Keywords: BMI; Ideal Weight; Healthiest Weight; Weight Management; Lipostat theory; Weight loss

List of Abbreviations: BMI: Body Mass Index; HA: Healthiest Area; M: Milestone

Introduction

The best body weight has been a topic of debate for a long time. The healthiest weight should be accurate and unique for everyone. Current methods use the BMI [1] as a widely used indicator of a person's optimal weight, measuring body fat based on height and weight. However, due to the variety of body types, muscle distribution, bone mass, etc, BMI is not appropriate as the only indication for diagnosis. One of the BMI disadvantages is misclassification [2]. BMI only cannot tell either the possibility of someone with Normal BMI to return to (or becoming) unhealthy in the future, which can be one of the reasons why ~80% of people succeeding in short-term weight loss are not able to maintain it long term [3]. Furthermore, caution should be observed when using the BMI as a measure for interpreting overweight and obesity as body composition can be highly variable yet have the same BMI. To avoid such situations, successful weight management programs should consider the required timing for feedback signals originating in adipose tissue to influence the brain centers that control eating behaviour and activity (metabolic and motor), the fundamental of the Lipostat theory [4], yet to be studied in humans. This theory controls long-term appetite, therefore responsible for the control of body weight. As fat deposits accumulate, satiety signals are sent to the hypothalamus in response in an attempt to suppress the feeling of hunger and maintain a constant body weight. Despite the mentioned caveats, the BMI remains as a widely used screening tool for determining obesity risk due to excess fat in several target populations as it is simple, inexpensive and easy to use. In this study, BMI values are sub-categorized and further validated "the healthiest area" (HA), a more stringent and efficient BMI category. Hypotheses are: 1) HA is suitable for long term weight loss and successfully achieving a healthy weight since it will set the body weight away from both overweight and underweight risks; and 2) since it would take a considerable longer amount of time for an unhealthy person to reach HA, this will facilitate weight-presetting, consistent with the Lipostat theory. These hypotheses were subjected to self-experimental validation (experimentation in which the experimenter conducts the experiment on her- or himself), aiming to set up the bases for implementation of effective weight management programs.

Materials and Methods

A single Spanish individual was subjected to case study. While there is a lack of studies comparing Spanish to other communities, studies in the United States showed that ethnic minorities, such us Hispanic, are overrepresented among the overweight and obese population, which highlight the importance of culture in the development of "culturally competent" weight-loss interventions [5].

The values of BMI Normal category (18.5–25) were transformed into ideal weights, based on height and weight, and further sub-categorized into three coloured categories (overweight risk, pink area; healthiest area (HA), blue area; and underweight risk, green area).

HA calculation

For example, an adult with height 5'10" (1.78meters) HA=144lbs (65.3kg) - 159lbs (72.2kg)

HA Formula

HA min = min + (max-min)/3

HA max = max - (max-min)/3

Three time milestones (M1-M3) were implemented: M1, Normal BMI; M2, HA; and M3, HA maintenance. In M1, to create an effective negative energy balance [6], a combination of weight loss and minimum activity programs were applied, consisting of a gradual decrease of calorie intake (in this case, until a minimum of 2000kcal/day) and a minimum calorie burning (200kcal/day) [7]. In M2, calorie intake compensation was applied, allowing extra calories until a maximum of half of the total calorie burnt by activity (e.g: if 300kcal/day were burnt, a minimum 2150kcal/day intake was allowed), thus maintaining a more relaxing negative energy balance. In M3, total calorie intake compensation was applied, thus establishing an ideal energy balance (e.g: 400kcal/day out, 2400kcal/day in).

If individuals fully endorse weight loss-related behavioural goals and feel more competent and autonomous (self- determination theory), their efforts are more likely to result in long-lasting behaviour change [8]. Both calorie in (meals) / out (work outs) were self-monitored by easy to use mobile apps [9] and subjected to calibration in case of metabolic adaptation [10]. The trickiest parts were the changing of daily habits and building long-term motivation. Simple habit-formation and rewarding strategies were implemented during M1. For example, any choice of food and activity was allowed (more encouraging than any pre-determined diet or activity implementation) [11] with the only restriction that daily meal choices should follow basic nutrition guidelines (10-35% Protein; 20-35% Fat; 45-65% Carbohydrates) [12]; for meals (calorie in), any healthy choice (e.g: veggies vs chips) was recorded as "ZERO" calorie in; for work out (calorie out), any choice of vigorous activity (e.g: running vs walking) was recorded as 2X calories out. Normal calorie values (in/out) provided by the mobile apps were recorded during M2 and M3.

For the purpose of this article, to facilitate the calculation of HA values and the reproducibility of the results an online draft-app was created (http://app.appsgeyser.com/MyHealthyWeight). By introducing height and weight, BMI, Ideal Weight, and HA values are automatically displayed. Precomputed values can also be downloaded here (https://www.dropbox.com/s/70ze5wgy61fggse/safeline.pdf?dl=0).

Results and Discussion

Starting at weight 101kg (Figure 1a) (and height 178 cm) (31.9 BMI category obese), the Normal BMI category (25 BMI; 79kg) was reached after 5 months and 2 weeks (weight loss rate 1kg/week), and HA (22.8 BMI; 72kg) after another 5 months and a half (weight loss rate 0.32kg/week) (11 months after initiating the experiment; average weight loss rate 0.66kg/week). The healthiest weight (21.7 BMI; 69kg) was achieved after another 4 months, and by choice, the lowest HA value (20.6 BMI; 65kg) 14months after. The milestones implementation provided with a robust and efficient way of gradually driving a person's weight to the desired values while costing less than conventional treatments [13]. Successful autonomy and habit formation was achieved by psychological reinforcement [14] likely due to the selection of the right experimental set up and the strong encouragement provided by the positive results. HA has so far been successfully reached and maintained for more than 2 years and a half since the beginning of the self-experiment. Total weight loss ~36kg. Weight loss rate always complied with International Weight Loss guidelines
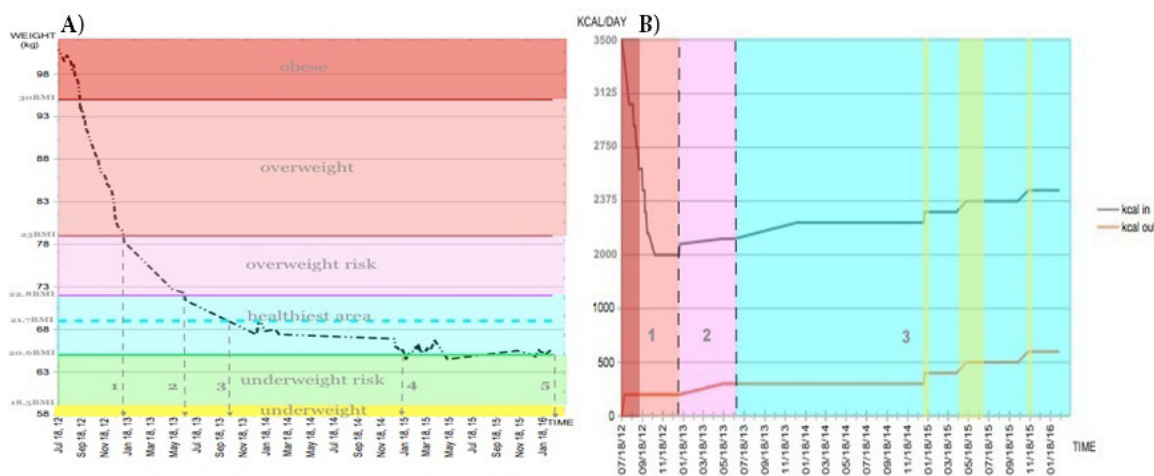

Figure 1: (A) Weight loss chart: The decreasing line shows an effective weight loss from obese to healthy category. HA was successfully reached and maintained for more than 2 years and a half since the beginning of the self-experiment; (B) Metabolic adaptation and weight presetting: Same colour coding as Figure 1A. Numbered areas 1,2 and 3 separated by dashed lines correspond to M1,M2,and M3, respectively. Small green areas within the blue one correspond to areas of metabolic adaptation coupled with compensation. Blue areas right after green ones show effective HA recovery

[15] throughout the three milestones. High peaks along the weight loss line correspond to high seasons with positive energy balance, and small up/down peaks correspond to metabolic adaptations. When metabolic adaptation was observed (Figure 1b), an increased food intake and physical activity was applied for compensation. Interestingly, the normal weight trend was always shortly recovered by reimplementing either a normal or compensated energy balance, and weight within HA was maintained for years. This suggests a successful healthy weight-presetting, consistent with the Lipostat theory. A low HA-presetting was chosen by personal preference, suggesting that a personal control of body weight is possible after a successful weight-presetting, further supporting this theory.

Conclusion

The combination of technology and personal science [16] works in harmony. HA was successfully achieved and maintained. HA categorization has advantages, compared to the only use of BMI: HA warns about situations such as overweight/underweight risks, it avoids misclassification (e.g., cases close to Normal BMI), and it works in conjunction with BMI, establishing max/min limits. Experiment tracking was crucial. However, mobile technology allowed a close interaction [17], providing autonomy [8] and strengthening motivation [18]. While studies show that ~80% of people are not able to keep weight loss long, likely due to lack of motivation over time [3], the implementation of any choice of food/activity (personal preference vs pre-established diets/routines) and simple rewarding strategies are probably the keys for building up positive-thinking and long-term motivation [19], as well as successful habit-formation [20], achieved 8-10weeks after implementation. This study represents the first successful long-term human self-experiment involving weight loss, metabolic adaptation and weight-presetting, consistent with the Lipostat theory. This study set up the bases for the systematic implementation of efficient weight management programs. With sufficient funding these results can be adapted and reproduced on a larger scale. Future studies should be able to further validate these results and answering some interesting questions raised here such as the exact timing the Lipostat requires for healthiest weight-presetting.

References

1. Keys A, Fidanza F, Karvonen MJ, Kimura N, Taylor HL (1972) Indices of relative weight and obesity. J Chronic Dis 25: 329-43.

2. Tomiyama AJ, Hunger JM, Nguyen-Cuu J, Wells C (2016) Misclassification of cardiometabolic health when using body mass index categories in NHANES 2005-2012. Int J Obes 40: 883-6.

3. Wing RR, Phelan S (2005) Long-term weight loss maintenance. Am J Clin Nutr 82: 222S-225S.

4. Kennedy GC (1953) The role of depot fat in the hypothalamic control of food intake in the rat. Proc R Soc Lond B Biol Sci 140: 578-96.

5. Lindberg NM, Stevens VJ, Halperin RO (2013) Weight-Loss Interventions for Hispanic Populations: The Role of Culture. J Obes 2013: 542736.

6. Hall KD, Heymsfield SB, Kemnitz JW, Klein S, Schoeller DA, et al. (2012) Energy balance and its components: implications for body weight regulation. Am J Clin Nutr 95: 989-94.

7. World Health Organization (2015) Healthy diet Fact sheet N°394.

8. Teixeira PJ, Silva MN, Mata J, Palmeira AL, Markland D (2012) Motivation, self-determination, and long-term weight control. Int J Behav Nutr Phys Act 9: 22.

9. FitBit (2016) The fitness app for everyone.

10. Trexler ET, Smith-Ryan AE, Norton LE (2014) Metabolic adaptation to weight loss: implications for the athlete. J Int Soc Sports Nutr 11: 7.

11. Shepherd R (2005) Influences on food choice and dietary behavior. Forum Nutr 57: 36-43.

12. U.S. Department of Health and Human Services (2015) U.S. Department of Agriculture (2015–2020) Dietary Guidelines for Americans (8th Edn) USA.

13. Jakicic JM, Tate DF, Lang W, Davis KK, Polzien K, et al. (2012) Effect of a Stepped-Care Intervention Approach on Weight Loss in Adults: The Step-Up Study Randomized Trial. JAMA 307: 2617-26.

14. Jacob JJ, Isaac R (2012) Behavioral therapy for management of obesity. Indian J Endocrinol Metab 16: 28-32.

15. Centers for Disease Control and Prevention (2016) Online Losing Weight guidelines, USA.

16. Weisse AB (2012) Self-Experimentation and Its Role in Medical Research. Tex Heart Inst J 39: 51-4.

17. Mendiola MF, Kalnicki M, Lindenauer S (2015) Valuable features in mobile health apps for patients and consumers: content analysis of apps and user ratings. JMIR Mhealth Uhealth 3: e40.

18. Kamel Boulos MN, Brewer AC, Karimkhani C, Buller DB, Dellavalle RP (2014) Mobile medical and health apps: state of the art, concerns, regulatory control and certification. Online J Public Health Inform 5: 229.

19. Epstein LH, Leddy JJ, Temple JL, Faith MS (2007) Food Reinforcement and Eating: A Multilevel Analysis. Psychol Bull 133: 884-906.

20. Gardner B, Lally P, Wardle J (2012) Making health habitual: the psychology of 'habit-formation' and general practice. Br J Gen Pract 62: 664-6.

Submit your next manuscript to Annex Publishers and benefit from:

‣ Easy online submission process
‣ Rapid peer review process
‣ Online article availability soon after acceptance for Publication
‣ Open access: articles available free online
‣ More accessibility of the articles to the readers/researchers within the field
‣ Better discount on subsequent article submission

Submit your manuscript at
http://www.annexpublishers.com/paper-submission.php