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Effect of Intensive Weight Loss Camp and Maintenance Clubs on Overweight School Children in Qatar

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Obesity and overweight continue to raise in Qatar due to a confluence of factors such as genetics, overeating, inactivity, tradition of food-centered social events, convenience, and advertising of energy-dense fast foods, and hot climate making outdoor activities impractical most of the year. Estimates by experts within and outside Qatar point to an extremely high rate of obesity and overweight in Qatar, with the World Health Organization placing the rate at 78%. This places Qatar among the top of countries worldwide in the overall prevalence of obesity and overweight. Childhood obesity in particular has also been rapidly increasing with the combined rate of obesity and overweight hovering around 40%, up from below 30% less than ten years ago. This trend is alarming due to the increased risks for obesity-related conditions such as diabetes, coronary heart diseases, and lower quality of living. Hence, comprehensive obesity prevention interventions are needed to stem the rise of obesity among Qatari children. This study was conducted to evaluate the effectiveness of an integrated weight loss intervention incorporating lifestyle education, physical activity, and behavioral psychology nudges among Qatari school children. The intervention was designed to integrate family and school support and fit within Qatari school system calendar and schedule. The study was branded Agdar/أردق and conducted by an interdisciplinary team of collaborators from Qatar (Qatar University, Supreme Education Council, Aspire, Hamad Medical Corporation) and external partners (Imperial College, Leeds Metropolitan University/MoreLife, UK).

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In the first year of a three-year intervention study, four randomly chosen schools in Qatar participated in the intervention with a total of 941 Qatari children (316 girls and 625 boys) between 9 to 12 years of age of whom 430 children were qualified to participate in the study. A group of four other randomly chosen schools served as control. Out of 430 qualified children, one hundred children (50 boys and 50 girls) with BMI in the 95th percentile from the intervention schools were enrolled in a two phase weight loss intervention. Phase 1 consisted of an intensive weight loss camp with a highly structured set of activity which combined a range of physical activity, lifestyle learning, dietary control, behavioral nudge techniques, and social activity. The second phase consisted of a ten week after school sessions on lifestyle education and weight management for those children who successfully completed camp. These after school/community clubs were run on school premises to facilitate integration in school schedule. The two phases were designed to be complementary: the camp helps children lose weight and introduces them healthy lifestyle behavior, whereas the after school phase embeds/consolidates the knowledge already learnt and helps in long term weight management. During the camp, children participated in a range of structured interactive and skill based activities including a mixture of water based activity, contact games and electives, where the children were able to choose from a range of physical activities. At camp, participants were subjected to a series of assessments including anthropometric (Weight, Height, BMI, Waist Circumference, Blood pressure), Lifestyle and Physical Activity Questionnaires (diet and physical activity), and Psychometric assessment (self-esteem and subjective well-being). During the clubs, only anthropometric measurements took place to ensure the children get the most out of the sessions focusing on reward and recognition and celebrating success regardless of the magnitude of the health improvement. This phase was designed to provide children and parents with the tools, know-how, and the confidence to carry on with the new healthy lifestyle at home as means to ensure durable weight management.

Data show that out of the 941 children in intervention schools, 430 children or 45.7% were either overweight or obese, having BMI in the top 95th centile by age. This rate is higher than the 42% we observed in a pilot study conducted by our team in 2014 and the 40% prevalence of overweight and obesity among children reported by other studies.

A total of 100 children aged 9–12 completed the camp with a significant reduction in percent BMI SDS of 12.5% ($p < .001$). The average percent BMI SDS reduction was higher for girls than that of boys (11 vs. 14%). This percent BMI SDS reduction is four times the minimum BMI SDS reduction (3%) required for health benefits in adolescents. The camp also resulted in a significant improvement in self-esteem ($p < .001$) with females edging males in terms of improvement in self-esteem. A slight but not significant improvement in subject wellbeing was also observed between the start and end of camp ($p = 0.128$).

These improvements in percent BMI SDS reduction (weight loss) and self-esteem occurred in a group that reported an unhealthy lifestyle profile with respect to physical activity and diet. In fact, participant responses painted a profile characterized by little or no physical activity (1 to 2 times/week) with two thirds of participants reporting fewer than 3 occasions of physical activity in their previous week. Participants' diet was characterized by low intake of fruits and vegetables and high intake of calorie-dense foods including sweets, soft drinks, and fast foods. Girls reported eating more fruits than boys but they seem to indulge more frequently in sweets.

As the camp phase resulted in a significant weight loss among all participants (100% of participant lost weight at variable levels), particularly girls who were more serious in participation, the clubs were found to help participants in weight management. After an initial weight gain during a 3 week period between camp and club phases (percent BMI SDS reduction down to 10%), participants were able to recover and maintain their post camp levels of BMI SDS reduction. Correlations on data suggest that the more clubs participants (particularly boys) attended, the more likely they were to lose weight during the club phase ($p = .028$).

In summary, the intervention camp was effective in significantly reducing the weight of all participants, despite its short duration of 11 days. After school clubs showed effectiveness in maintaining or further enhancing weight loss achieved in the camp and in engaging parents. The synergistic effect of the camp and after school/community clubs suggests promising potential for successful incorporation of this integrated intervention into the school curriculum, especially since the camp occurs during mid-year school break and the

after school clubs during school days. The succeeding cohorts will provide further data for validation of this potential. The one year follow up data are being collected to assess the durability of weight changes and the stickiness of behavioral changes induced by the different phases of this intervention.