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ORIGINAL ARTICLE

Three percent weight reduction is the minimum requirement to improve health hazards in obese and overweight people in Japan



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Summary

Objective: Adequate goal-setting is important in health counselling and treatment for obesity and overweight. We tried to determine the minimum weight reduction required for improvement of obesity-related risk factors and conditions in obese and overweight Japanese people, using a nationwide intervention programme database. **Methods:** Japanese men and women ($n = 3480$; mean age \pm standard deviation [SD], 48.3 ± 5.9 years; mean body mass index \pm SD, $27.7 \pm 2.5 \text{ kg m}^{-2}$) with ‘‘Obesity Disease’’ or ‘‘Metabolic Syndrome’’ participated in a 6-month lifestyle modification programme (specific health guidance) and underwent follow-up for 6 months thereafter. The relationship between percent weight reduction and changes in 11 parameters of obesity-related diseases were examined.

Abbreviations: CVD, cardiovascular disease; BMI, body mass index; SBP, systolic blood pressure; DBP, diastolic blood pressure; TG, triglycerides; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; FPG, fasting plasma glucose; HbA1c, hemoglobin A1c; AST, aspartate aminotransferase; ALT, alanine aminotransferase; γ -GTP, γ -glutamyl transpeptidase; UA, uric acid.

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Results: Significant weight reduction was observed 6 months after the beginning of the programme, and it was maintained for 1 year. Concomitant improvements in parameters for obesity-related diseases were also observed. One-third of the subjects reduced their body weight by $\geq 3\%$. In the group exhibiting 1% to $<3\%$ weight reduction, plasma triglycerides (TG), low-density lipoprotein cholesterol (LDL-C), haemoglobin A1c (HbA1c), aspartate aminotransferase (AST), alanine aminotransferase (ALT) and γ -glutamyl transpeptidase (γ -GTP) decreased significantly, and high-density lipoprotein cholesterol (HDL-C) increased significantly compared to the control group ($\pm 1\%$ weight change group). In addition to the improvements of these 7 parameters (out of 11), significant reductions in systolic blood pressure (SBP), diastolic blood pressure (DBP), fasting plasma glucose (FPG) and uric acid (UA) (total 11 of 11 parameters) were observed in the group with 3% to $<5\%$ weight reduction. In the group with $\geq 5\%$ weight reduction, the same 11 parameters also improved as those in the group with 3% to $<5\%$ weight reduction.

Conclusion: The 6-month lifestyle modification programme induced significant weight reduction and significant improvement of parameters of obesity-related diseases. All the measured obesity-related parameters were significantly improved in groups with 3% to $<5\%$ and $\geq 5\%$ weight reduction. Based on these findings, the minimum weight reduction required for improvement of obesity-related risk factors or conditions is 3% in obese and overweight (by WHO classification) Japanese people.

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Introduction

Obesity, as defined by excessive fat accumulation in the body, is often associated with lifestyle-related diseases such as hypertension, dyslipidemia, type 2 diabetes and atherosclerotic cardiovascular disease (CVD) [1,2]. Recently, Metabolic Syndrome, a clustering of high plasma glucose, dyslipidemia and high blood pressure in the presence of abdominal fat accumulation, has emerged as a high-risk syndrome for CVD and diabetes [3–5]. In Japan, as in other developed and developing countries, obesity is a medical and social problem. Prevention of weight gain is therefore crucial for decreasing risks and manifestations of these life-threatening diseases.

In 1997, the International Association for the Study of Obesity (IASO) and World Health Organization (WHO) jointly proposed criteria for obesity and overweight, i.e., body mass index (BMI) $\geq 30 \text{ kg m}^{-2}$ and 25 to $<30 \text{ kg m}^{-2}$, respectively [6]. In Japan in 2000, the Japan Society for the Study of Obesity (JASSO) defined obesity as BMI $\geq 25.0 \text{ kg m}^{-2}$ because in Japan this value has been established as the cut-off for increased risk for obesity-related complications, such as hypertension, dyslipidemia and hyperglycemia [7].

In 2000, JASSO also defined criteria for “Obesity Disease,” i.e., obesity associated with life-threatening diseases, as one or more lifestyle-related diseases in the presence of BMI $\geq 25 \text{ kg m}^{-2}$ [7], and in 2005, criteria for “Metabolic Syndrome” were also established [8]. In 2008, the Japanese government (Ministry of Health, Labor and Welfare)

implemented a new system of health check-ups followed by specific counselling to screen for people with these risk factors [9]. Within this system, based on the results of their annual health check-up, people with “Obesity Disease” or “Metabolic Syndrome” were assigned to participate in lifestyle modification programmes.

In previously reported large-scale lifestyle intervention studies, such as the Diabetes Prevention Programme (DPP) [10] and the Finnish Diabetes Prevention Study [11], 5–7% weight reduction resulted in improvements in blood pressure (BP), lipids and glucose profile. It has been shown that $\geq 5\%$ or $\geq 10\%$ body weight reduction is required to improve obesity-related health hazards in Caucasian populations [12,13]. There is a scarcity of information, however, on the minimum weight reduction required for obtaining these effects in Asian populations. We hypothesised that $\geq 3\%$ weight reduction is enough to prevent or eliminate obesity-related health hazards in Asian populations.

The aim of the present study was to investigate the relationship between the degree of weight reduction and the improvement of obesity-related metabolic parameters, and to determine the minimum weight reduction required for improvement of obesity-related risk factors or conditions in Japanese who have “Obesity Disease.” Another research question was whether the recommended proposal by JASSO that a 3 kg reduction in body weight or 3 cm reduction in abdominal circumference is effective for the prevention or improvement of “Metabolic Syndrome”.

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