Lifestyle intervention in primary care to reduce metabolic risk

Intervención sobre estilos de vida en atención primaria para disminuir riesgo metabólico

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Abstract

Introduction: Obesity is associated with serious chronic health risks. Lifestyle interventions can induce weight loss.
Objective: To determine the effectiveness of a weight loss program administered in primary care among a population with obesity.
Methods: A high-intensity lifestyle intervention was conducted in primary care clinics in a population with obesity.
Results: GSA decreased from baseline to 12 months (-4.5 mg/dL [(ES): 2.1; P = 0.04]) but not at 24 months (-0.8 mg/dL [ES: 2.1; P = 0.70]) in the IIE group.
Conclusions: A high-intensity program for obesity produced significant improvements in a population over 24 months.

Keywords: obesity, lifestyle, primary care, diabetes mellitus, metabolic syndrome source: DeCS
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Resumen

Introducción: La obesidad se asocia con graves riesgos crónicos para la salud. Las intervenciones de estilo de vida pueden inducir una pérdida de peso.
Objetivo:Determinar la efectividad de un programa para la pérdida de peso administrado en atención primaria entre una población con obesidad.
Método: Se realizó una intervención de estilo de vida de alta intensidad en clínicas de atención primaria en una población con obesidad.
Resultados: La GSA disminuyó desde el inicio hasta los 12 meses (−4,5 mg/dL[(EE): 2,1; P = 0,04]) pero no a los 24 meses (−0,8 mg/dL [EE: 2,1; P = 0,70]) en el grupo IIE.
Conclusiones:Un programa de alta intensidad para la obesidad produjo mejoras significativas en una población durante 24 meses.
Palabras clave: obesidad, estilo de vida, atención primaria, diabetes mellitus, síndrome metabólico
fuente: DeCS

Introduction

In 2020-2021, the prevalence of obesity among adults was estimated at 42.4%, and severe class III obesity was 9.2%. Obesity is associated with serious chronic health risks, such as cardiovascular disease (CVD), type 2 diabetes, several types of cancer, depression, and premature mortality, representing a substantial economic and public health burden in many countries[(1)]. Certain sociodemographic groups are particularly affected by the obesity epidemic and, consequently, are at the most significant risk for adverse health effects. Along with race/ethnicity, other social determinants of health, such as lower levels of education, income and food security, intersect to increase the risk of obesity and related comorbidities[(2)]. Importantly, such inequalities are further underpinned by policies (e.g., health care access and affordability), systems (e.g., racism, discrimination, segregation), and environments (e.g., community, neighborhood) that also lead to higher levels of obesity in race/ethnic minorities.

Large trials, such as Look AHEAD, have shown that high-intensity lifestyle interventions delivered in academic health centers can induce weight loss (PP) of 5.8% and 6.4% over two years, respectively, and that these weight reductions are accompanied by beneficial health changes in blood pressure (BP), glucose control, and dyslipidemia[(3)].

PP interventions in primary care have produced a range of PP (1-2 kg in low-intensity interventions to 4-7 kg in higher-intensity interventions)[(4,5)]. For example, in the Practice-based Opportunities for Weight Reduction (POWER) trials, greater PP was experienced in the Baltimore (5.2%) and Philadelphia (4.7%) trials compared to the Boston trial (1.7%)[(6)]. In addition, a 24-month cluster randomized trial was conducted in which trained health coaches delivered a personally integrated high-intensity lifestyle intervention in primary care clinics among an underserved population with obesity[(7)]. Similar to the demonstrated efficacy of the PP trial, participants who received an intensive lifestyle intervention (ILI) were hypothesized and would show improvements in cardiometabolic risk factors relative to those who received usual care (HA).

Method

A 24-month high-intensity lifestyle intervention as conducted in primary care clinics in the city of Ambato among a racially diverse, low-income population with obesity. The trial was conducted between April 2018 and September 2021. Participants were recruited from participating clinics and were considered eligible if they were aged 20 to 75 years, had a BMI of 30 to 50 kg/m 2, and were patients of a participating clinic. In addition, participants were excluded if they were currently participating in a PP program, were using PP medications, had undergone bariatric surgery in the past two years, or had lost more than 10 pounds of weight in the past six months. This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

The IIE program was incorporated into the primary care clinics and consisted of weekly sessions with trained health coaches (16 face-to-face and 6 by telephone) for the first six months and at least monthly sessions for the remaining 18 months, alternating between face-to-face and telephone sessions. During the intervention, health coaches worked with participants to meet the predefined individual goal of 10% PP by coaching them to develop and adhere to personalized action plans that focused on changes in eating, diet, and physical activity behavior. If deviations occurred, the personalized action plans were adjusted, using additional components of the “toolbox” approach (i.e., tailored behavioral, nutritional, and physical activity strategies) that have been shown to improve intervention efficacy in previous clinical trials.

Participants in the clinics assigned to the AH group continued to receive their normal care from their PCP during the 24-month intervention period.

Fasting blood glucose (FPG) and lipids (total cholesterol, high-density lipoprotein cholesterol [HDL-C], low-density lipoprotein cholesterol [LDL-C], and triglycerides) were measured at baseline, at month 12, and month 24 by fingerstick. In addition, resting systolic BP (SBP) and diastolic BP (DBP) were measured at baseline and on all follow-up visits after five minutes of seated rest. At each time point, two measurements were taken, with one minute between measurements. If the two measurements differed by more than 20 mmHg (SBP) or 10 mmHg (DBP), a third measurement was obtained and the mean of the two closest measurements was used for analysis.

In addition to the prespecified outcome measures, metabolic syndrome severity z-score (MetS-Z) values were calculated for all assessment visits, as previously described.

Covariates in the models included study arm, time of evaluation and their interaction, age, sex, and race. In addition, the binary variables of hypertension, diabetes, and high cholesterol medication use (use versus nonuse) at each time point were entered into the respective models as additional covariates. Finally, intention-to-treat analyses were performed, including all participants as randomized, regardless of the number of assessments obtained, and restricted maximum likelihood using all available data. Database and statistical processing of the data were performed and analyzed in SPSS 26 statistical software (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation and interpretation.

Results

The trial enrolled a total of 803 adults with a mean age of 49.4 years (standard deviation [SD]: 13.1) and a mean BMI of 37.2 kg/m 2 (SD: 4.7) in the IIE group (n=452) and the AH group (n=351). One hundred and thirty-three participants (16.6%) were lost to follow-up at 24 months. Eighteen clinics (9 in each group) and 803 participants (452 in IIE and 351 in AH) were included in the primary analysis.

GSA decreased from baseline to 12 months (-4.5 mg/dL [standard error (SE): 2.1; P = 0.04]) but not at 24 months (-0.8 mg/dL [SE: 2.1; P = 0.70]) in the IIE group. In the HA group, GSA did not change significantly at any of the time points (all P > 0.20), leading to a significant mean difference of -7.1 mg/dL (ES: 2.4; P <0.01) at 12 months and -0.8 mg/dL (ES: 2.5; P = 0.76) at 24 months in favor of the IIE group. HDL-C increased in the IIE group by 4.7 mg/dL (ES: 0.6; P<0.01) at 12 months and by 4.3 mg/dL (ES: 0.7; P<0.01) at 24 months, whereas they did not change in the AH group at any time point.

Similarly, a significant mean difference was found in the total:HDL-C ratio between the two groups at both time points, with a reduction in the IIE group relative to the AH group of -0.29 (ES: 0.07; P<0.01) at 12 months and -0.31 (ES: 0.08; P<0.01) at 24 months. In addition, MetS-Z values were reduced in the IIE group at 12 months (-0.35 [ES: 0.06; P<0.01]) and 24 months (-0.20 [ES: 0.06; P<0.01]), whereas they did not change in the AH group at any time point. The mean difference in the change in MetS-Z between the groups was -0.40 (ES: 0.07; P<0.01) at 12 months and -0.21 (ES: 0.07; P=0.01) at 24 months, both in favor of the IIE group.

Table 1. Change in cardiometabolic risk factors over two years.

	AH	IIE	Difference	Valueof p
Fastingglucose (mg/dL)				
At 12 months	2,6 (-1,5, 6,7)	-4,5 (-8,9, -0,1)	-7,1 (-12,0, -2,1)	<0.01
At 24 months	0,0 (-4,4, 4,3	-0,8 (-5,4, 3,7)	-0,8 (-6,2, 4,6)	0.76
TotalCholesterol (mg/dL)				
At 12 months	0,8 (-3,2, 4,9)	2,9 (-1,2, 7,0)	2,0 (-3,0, 7,0)	0.40

At 24 months	0,8 (-3,6, 5,1)	5,2 (0,8, 9,5)	4,4 (-1,1, 9,8)	0.11
LDL cholesterol (mg/dL)				
At 12 months	1,3 (-2,2, 4,7)	1,2 (-2,5, 4,9)	-0,1 (-4,4, 4,2)	0.97
At 24 months	1,9 (-1,9, 5,7)	3,5 (-0,4, 7,4)	1,6 (-3,2, 6,4)	0.49
HDL cholesterol (mg/dL)				
At 12 months	0,6 (-0,7, 1,9)	4,7 (3,3, 6,0)	4.1 (2.4, 5.7)	<0.01
At 24 months	-0,3 (-1,7, 1,1)	4.3 (2.9, 5.7)	4.6 (2.9, 6.3)	<0.01
Non HDL cholesterol (mg/dL)				
At 12 months	1,0 (-3,0, 5,0)	-0,5 (-4,5, 3,6)	-1,4 (-6,4, 3,6)	0,55
At 24 months	1,7 (-2,7, 6,1)	1,9 (-2,5, 6,2)	0,2 (-5,4, 5,8)	0,95
Total:HDLcholesterol ratio				
At 12 months	0,01 (-0,11, 0,13)	-0,28 (-0,41, -0,16)	-0,29 (-0,44, -0,14)	<0.01
At 24 months	0,11 (-0,03, 0,24)	-0,20 (-0,34, -0,06)	-0,31 (-0,47, -0,14)	<0.01
Triglycerides (mg/dL)				
At 12 months	-0,2 (-11,2, 10,8)	-7,8 (-18,9, 3,3)	-7,6 (-21,4, 6,3)	0.26
At 24 months	-3,6 (-14,5, 7,4)	-9,3 (-20,2, 1,7)	-5,7 (-19,4, 8,0)	0.39
Systolicbloodpressure (mmHg)				
At 6 months	1,2 (-1,5, 4,0)	-0,2 (-2,8, 2,4)	-1,4 (-4,1, 2,2)	0.42
At 12 months	2,1 (-0,7, 4,9)	0,4 (-2,3, 3,0)	-1,8 (-4,4, 2,0)	0.33
At 18 months	1,1 (-1,8, 4,0)	-0,2 (-2,9, 2,5)	-1,3 (-4,1, 2,5)	0.48
At 24 months	0,4 (-2,5, 3,3)	1,9 (-0,8, 4,7)	1,6 (-1,3, 5,3)	0.41
Diastolicbloodpressure (mmHg)				
At 6 months	0,2 (-1,6, 2,1)	-0,9 (-2,7, 0,8)	-1,2 (-3,5, 1,2)	0.32
At 12 months	0,2 (-1,7, 2,1)	-1,3 (-3,1, 0,4)	-1,5 (-3,9, 0,9)	0.21
At 18 months	-0,7 (-2,6, 1,1)	-1,8 (-3,6, 0,0)	-1,1 (-3,5, 1,4)	0.37
At 24 months	-0,6 (-2,5, 1,3)	-0,6 (-2,4, 1,2)	0,0 (-2,4, 2,5)	0.97
Mean arterial pressure (mmHg)				
At 6 months	0,6 (-1,5, 2,6)	-0,7 (-2,6, 1,3)	-1,2 (-3,9, 1,4)	0.35
At 12 months	0,8 (-1,3, 2,9)	-0,8 (-2,8, 1,2)	-1,6(-4,3, 1,1)	0.24
At 18 months	-0,1 (-2,3, 2,0)	-1,3 (-3,3, 0,7)	-1,2 (-3,9, 1,6)	0.40
At 24 months	-0,3 (-2,5, 1,9)	0,3 (-1,8, 2,3)	0,6 (-2,2, 3,4)	0,69

Z-score of metabolic syndrome severity				
At 12 months	0,05 (-0,07, 0,17)	-0,35 (-0,48, -0,23)	-0,40 (-0,54, -0,26)	<0.01
At 24 months	0,01 (-0,12, 0,13)	-0,20 (-0,33, -0,07)	-0,21 (-0,36, -0,06)	0.01

Source: statistical analysis, values are means (95% confidence intervals), (P<0.05).Abbreviations: IIE, intensive lifestyle intervention; AH, usual care.

Women and men responded overall similar to the intervention; however, for HDL-C, the difference between AH and IIE was almost twice as large in men as in women (both time points) and for GSA at 12 months, the between-group difference was five times larger in men than in women. In addition, a significant between-group difference was found for women but not men for the total: HDL-C and Mets-Z ratio (both at 24 months). In interpreting these sex-based subgroup analyses, the markedly smaller sample of men (20.2 % men in HA, 11.9 % men in IIE, 15.6 % men overall) should be kept in mind, which likely contributed to the substantial variability in the men's data for all outcomes. In addition, there was a potential age effect for GSA with a significant reduction in IIE compared with AH alone in older adults, and it was noted that younger participants in both groups substantially increased GSA by approximately 20 mg/dL (P<0.01 for all) at both time points. Similarly, only older adults in IIE decreased their total:HDL-C and MetS-Z ratio significantly at both time points compared with AH, showing a substantial reduction in MetS-Z compared with the other age groups.

Regression models revealed significant direct associations between percent change in weight and change in GSA (Month 12: B=0.59, EE=0.20, P<0.01; Month 24: B=0.80, EE=0.19, P<0.01), MetS-Z (Month 12: B=0.04, EE=0.01, P<0.01; Month 24: B=0.05, EE=0.01, P<0.01) and total:HDL-C ratio (Month 12: B=0.02, EE=0.01, P<0.01; Month 24: B=0.03, EE=0.01, P<0.01). In addition, a significant inverse association was found between percent weight change and change in HDL-C (Month 12: B=-0.30, ES=0.07, P<0.01; Month 24: B=-0.42, ES=0.06, P<0.01). Significant associations were consistent over time.

Discussion

The present results show that a high-intensity lifestyle-based obesity treatment program delivered in primary care among an underserved population leads to significant improvements in several cardiometabolic outcomes, highlighting the clinical relevance of the intervention. The intervention led to reductions in GSA over 12 months, which were not sustained over 24 months. Furthermore, the IIE group showed beneficial increases in HDL-C at 12 and 24 months compared to the AH group, which remained relatively unchanged at both time points. This increase in HDL-C likely drove the significant decrease in the HDL-C:total ratio in the IIE group compared with the AH group at both time points, particularly because total cholesterol, LDL-C, and non-HDL-C did not change during the intervention in either group.

Similar to our results, the primary care-based behavioral lifestyle intervention from the POWER-UP trial, which showed a mean PP of 4.7% at 24 months (5.0% at 24 months), found a significant difference in GSA between the improved test in the lifestyle intervention group and the control group at 12 but not at 24 months[8].

The lack of change in GSA from baseline to 24 months, as observed for the IIE group, is comparable (mean PP of 5.8% at 24 months) to that performed in academic health centers[9]. No change was found in GSA from baseline to 24 months in the lifestyle intervention group (baseline values of ~106 mg/dL); however, a significant mean difference of approximately 5 mg/dL was found between

groups at 24 months[10]. In the Look AHEAD study, also conducted in health centers (mean PP of 6.4% at 24 months, they found decreases in GSA at 12 months in both the lifestyle intervention group and the control group, with a significantly greater decrease in the intervention group (mean difference of approximately 14 mg/dL)[11]. Of note, Look AHEAD specifically enrolled persons with type 2 diabetes who were approximately 10 years older than the participants in the present study. Furthermore, the improvements in HDL-C in the IIE group relative to the AH group were approximately double compared with the increases seen in Look AHEAD at 12 and 24 months (approximately +2 mg/dL for both time points); other trials and POWER-UP did not find a significant difference between the intervention and the respective control group at any time point[12]. The improvements in HDL-C are of particular interest, as statins and non-statin cholesterol-lowering drugs affect HDL-C less than LDL-C and all apolipoprotein B-containing lipoproteins, and changes in HDL -C are therefore more likely to be attributable to the IIE program[13]. Although these results are undeniably positive, it must be emphasized that c-HDL is more of a marker than a mediator of cardiovascular risk. While higher c-HDL is generally strongly associated with lower CVD risk in epidemiological studies, in intervention trials, increases in c-HDL through pharmacological means or due to PP and exercise do not consistently lead to improvements in CVD endpoints[14].

The significant reductions in MetS-Z at both time points in the IIE group compared with the AH group further demonstrate the reduction in cardiometabolic risk achieved with the high-intensity lifestyle intervention. In addition, the effect was comparable, although slightly attenuated, compared to the lifestyle intervention group in another study that showed decreases of 0.40 (0.35) and 0.31 (0.20) at 12 and 24 months, respectively[15].

While the demonstrated improvements in cardiometabolic risk factors speak to the success of the IIE program, and sustained improvements in these risk factors are likely to be beneficial for long-term CVD risk, it must be recognized that, to date, de facto reductions in CVD events through IIE have not yet been shown[16].

However, an age effect was found for GSA and Mets-Z with significant improvements in the IIE group compared to the AH group at both time points only in older adults. This is congruent with the findings of another study and suggests that the efficacy of the trial IIE in preventing impaired glucose tolerance is increased in older adults (over 60 years)[17].

There is a gap between obesity management guidelines and what is currently implemented in primary care. Treatment models need treatments adapted to real-life settings that add effective delivery methods for obesity treatment in primary care. The results of our trial demonstrated that significant PP is possible in primary care by incorporating a health coach into the collaborative care team[18].

The cluster-randomized design of the trial minimized contamination effects between the two arms of the study. A limitation of the trial, as is often the case in lifestyle interventions, is that the sample was mostly women, which limits the generalizability of the present results to both sexes[19]. Finally, although the studyconsidered the use of blood pressure, glucose, and cholesterol medications (use versus nonuse) at each time point, it could not measure changes in dosage over time and medication adherence. These shortcomings may have influenced our results[20].

Conclusions

A pragmatic, high-intensity, lifestyle-based obesity treatment program delivered by trained health counselors in primary care resulted in significant improvements in several cardiometabolic risk markers in an underserved population over 24 months, which could translate into a long-term reduction in CVD risk.

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