Long-term effects (>24 months) of multiple lifestyle intervention on major cardiovascular risk factors among high risk subjects: a meta-analysis

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Background: The evidence of the long-term effects of multiple lifestyle intervention on cardiovascular risk is uncertain. We aimed to summarize the evidence from randomized clinical trials examining the efficacy of lifestyle intervention on major cardiovascular risk factors in subjects at high cardiovascular risk.

Methods: Eligible trials investigated the impact of lifestyle intervention versus usual care with minimum 24 months follow-up, reporting more than one major cardiovascular risk factor. A literature search updated April 15, 2020 identified 12 eligible studies. The results from individual trials were combined using fixed and random effect models, using the standardized mean difference (SMD) to estimate effect sizes. Small-study effect was evaluated, and heterogeneity between studies examined by subgroup and meta-regression analyses considering patient- and study-level variables.

Results: Small-study effect was not identified. Lifestyle intervention reduced systolic blood pressure modestly with an estimated SMD of -0.13, 95% confidence interval (CI): -0.21 to -0.04, with moderate heterogeneity ($I^2 = 59\%$), corresponding to a mean difference of approximately 2 mmHg (MD = -1.86, 95% CI: -3.14 to -0.57, $p = 0.0046$). This effect disappeared in the subgroup of trials judged at low risk of bias (SMD = 0.02, 95% CI: -0.08 to 0.11). For the outcome total cholesterol SMD was -0.06, 95% CI: -0.13 to 0.00, with no heterogeneity ($I^2 = 0\%$), indicating no effect of the intervention.

Conclusion: Lifestyle intervention resulted in only a modest effect on systolic blood pressure and no effect on total cholesterol after 24 months. Further lifestyle trials should consider the challenge of maintaining larger long-term benefits to ensure impact on cardiovascular outcomes.