

Meditation vs. Metformin in the Management of Metabolic Syndrome

Macey Riese PA-S, Sharon Gentry PA-C, Abigail Allen PA-C
The University of Findlay

Introduction

Metabolic Syndrome (MetS) is a rapidly growing health concern in the United States and is estimated to impact more than 34% of American adults.¹ The components of MetS include central obesity, dyslipidemia, hypertension, and impaired glucose metabolism, specifically the collective presence of three or more of these factors in a single patient.²

	Waist Circumference	HDL	Triglycerides	Blood Pressure	Fasting Glucose
Male	>40"	≤40 mg/dL	≥150 mg/dL	>130/85 mmHg	≥110 mg/dL
Female	>35"	≤50 mg/dL	≥150 mg/dL	>130/85 mmHg	≥110 mg/dL

Patients with MetS exhibit an increased risk for cardiovascular disease, type II diabetes mellitus, stroke, and mortality.¹

The current treatment recommendation for adults with MetS is to target the modifiable risk factors that are shown to be associated with MetS, including smoking, sedentary behavior, and eating behavior.² Additional adjunct treatment options that have been proposed for MetS include pharmacologic intervention with metformin therapy or psychological interventions with meditation practices.

Interventions

Meditation is an umbrella term referring to any mental mindfulness practice designed to improve concentration, insight, or awareness of the present moment, promote relaxation, reduce stress, settle the mind, achieve a state of increased consciousness, and reduce perceived suffering and increase happiness.³

Metformin is an oral biguanide pharmacologic agent used to improve glycemic control in adult patients with type 2 diabetes mellitus and may also be effective in a number of other applications such as treatment for MetS, cancer, obesity, nonalcoholic fatty liver disease (NAFLD), and polycystic ovary syndrome (PCOS).⁴

Methods

Research articles were located using the MEDLINE with Full Text (EBSCO) database and PubMed/Medline database between the fall of 2018 and summer of 2019. Articles were assessed to meet inclusion criteria such as: research performed between 1998-2018 on the US adult population with MetS, the US adult population at risk for MetS, and the non-US adult population with or at risk for MetS. All included research pertained to the study of lifestyle interventions, metformin interventions, or meditation interventions and their respective effects on MetS parameters.

Results

Study Type	Participants	Data	Time
Mindfulness intervention (Article 1) ⁵	100 obese adults without DM (28% with MetS at baseline)	-4.1mg/dL vs control	18 months
Mindfulness Intervention (Article 2) ⁶	84 adults with heart disease at baseline	-6mg/dL vs control	16 weeks
Metformin intervention (Article 7) ⁷	32 adults with MetS at baseline	-16mg/dL vs control	12 weeks
Metformin intervention (Article 8) ⁸	16 adults with MetS parameters at baseline	-4.5mg/dL vs control	16.5 weeks
Metformin intervention (Article 9) ⁹	21 overweight or obese adult females with or without impaired fasting glucose at baseline	-5.8mg/dL vs simvastatin group	16 weeks

Study Type	Participants	Data	Time
Mindfulness Intervention (Article 1) ⁵	100 obese adults without DM (28% with MetS at baseline)	Adjusted ΔHOMA-IR -0.77	12 months
Mindfulness Intervention (Article 2) ⁶	84 adults with heart disease at baseline	Adjusted ΔHOMA-IR -0.75	16 weeks
Metformin intervention (Article 7) ⁷	32 adults with MetS at baseline	Adjusted ΔHOMA-IR -0.89	12 weeks
Metformin intervention (Article 9) ⁹	21 female adults	Adjusted ΔHOMA-IR -1.9	16 weeks

Study Type	Participants	Data	Time
Mindfulness intervention (Article 1) ⁵	100 obese adults without DM (28% with MetS at baseline)	Δ2.9mg/dL vs control	18 months
Mindfulness intervention (Article 2) ⁶	84 adults with heart disease at baseline	No statistically significant change noted	16 weeks
Metformin intervention (Article 7) ⁷	32 adults with MetS at baseline	No statistically significant change noted	12 weeks
Metformin intervention (Article 8) ⁸	16 adults with MetS parameters at baseline	+7.0mg/dL	16.5 weeks
Metformin intervention (Article 9) ⁹	21 overweight or obese female adults	No statistically significant change noted	16 weeks

Discussion

The goal of this review was to compare adjunctive therapies for MetS which can be added to the current treatment approach of increased exercise, diet modification, and smoking cessation.

In studies of the impact of meditation on MetS parameters, statistically significant improvements in fasting glucose were shown in both of the cohort studies where this parameter was measured.

Metformin interventions showed repeated improvement in fasting plasma glucose and insulin resistance (measured by HOMA-IR) in each study where these parameters were measured.

Conclusion

The improvement in fasting glucose and insulin resistance seen in both the meditation intervention and metformin intervention is likely explained by both the benefit of the therapy as well as the tendency for these parameters to worsen over time without any intervention.

The relationship between depressive symptomology, low mindfulness, and MetS prevalence should be viewed as an additional treatment gateway when determining therapeutic options in a specific patient.

The lack of significant resolution of MetS in women with metformin therapy observed by the large cohort study is a surprising result. This result was not reflected in the smaller cohort studies, however the conflicting results force us to question the efficacy of the drug in the female population.

Overall, the presence of MetS in a single patient requires a multifactorial and tailored treatment approach. Baseline laboratory parameters, gender, and depressive symptomology at baseline should all be considered in each patient before proceeding with establishing a treatment plan tailored for the individual.

References

- 1 Sohl SJ, Wallston KA, Watkins K, Birdee GS. Yoga for Risk Reduction of Metabolic Syndrome: Patient-Reported Outcomes from a Randomized Controlled Pilot Study. *Evidence-Based Complementary And Alternative Medicine: Ecam*. 2016;2016:3094589. <https://login.ezproxy.findlay.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=mnh&AN=27847524&site=ehost-live>. Accessed November 16, 2018
- 2 Guyot E, Baudry J, Hercberg S, Galan P, Kesse-Guyot E, Péneau S. Mindfulness Is Associated with the Metabolic Syndrome among Individuals with a Depressive Symptomatology. *Nutrients*. 2018;10(2). doi:10.3390/nu10020232. <https://eds-b.ebscohost.com.ezproxy.findlay.edu/ehost/pdfviewer/pdfviewer?vid=10&sid=a443b3d1-df90-48c5-8eed-038e79867671%40pdc-v-sessmgr02>. Accessed November 16, 2018.
- 3 Meditation and Cardiovascular Risk Reduction: A Scientific Statement From the American Heart Association. *J Am Heart Assoc*. 2019;8(2):e004176. Published 2019 Jan 15. doi:10.1161/JAHA.117.004176. Accessed May 21, 2019.
- 4 Zhou J, Massey S, Story D, Li L. Metformin: An Old Drug with New Applications. *Int J Mol Sci*. 2018;19(10):2863. Published 2018 Sep 21. doi:10.3390/ijms19102863. Accessed May 21, 2019.
- 5 Daubenmier J, Moran PJ, Kristeller J, et al. Effects of a mindfulness-based weight loss intervention in adults with obesity: A randomized clinical trial. *Obesity (Silver Spring, Md)*. 2016;24(4):794-804. doi:10.1002/oby.21396. https://journals-ohiolink-edu.ezproxy.findlay.edu/pg_99?213010949113380::NO::P99_ENTITY_ID,P99_ENTITY_TYPE36844511,M_AIN_FILE&cs=3gq8rike0jMHkAG7eRv18yDeO3-m2mpJfT3oLbOHTyo08z158maq377LDoh9z2_rF2J8zxZ2_coV1YaEQwklWw Accessed November 16, 2018.
- 6 Paul-Labrador M, Polk D, Dwyer JH, et al. Effects of a randomized controlled trial of transcendental meditation on components of the metabolic syndrome in subjects with coronary heart disease. *Archives Of Internal Medicine*. 2006;166(11):1218-1224. <https://login.ezproxy.findlay.edu/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=mnh&AN=16772250&site=ehost-live>. Accessed November 16, 2018.
- 7 Vitale C, Mercurio G, Cornoldi A, Fini M, Volterrani M, Rosano GMC. Metformin improves endothelial function in patients with metabolic syndrome. *Journal Of Internal Medicine*. 2005;258(3):250-256. <https://search.ebscohost.com/login.aspx?direct=true&db=mnh&AN=16115299&site=ehost-live>. Accessed May 21, 2019.
- 8 Lima LM, Wiernsperger N, Kraemer-Aguar LG, Bouskela E. Short-term treatment with metformin improves the cardiovascular risk profile in first-degree relatives of subjects with type 2 diabetes mellitus who have a metabolic syndrome and normal glucose tolerance without changes in C-reactive protein or fibrinogen. *Clinics (Sao Paulo)*. 2009;64(5):415-420. doi:10.1590/S1807-59322009000500008. Accessed May 21, 2019.
- 9 Bulcão C, Giuffrida FMA, Ribeiro-Filho FF, Ferreira SRG. Are the beneficial cardiovascular effects of simvastatin and metformin also associated with a hormone-dependent mechanism improving insulin sensitivity? *Brazilian Journal Of Medical And Biological Research = Revista Brasileira De Pesquisas Medicas E Biologicas*. 2007;40(2):229-235. <https://search.ebscohost.com/login.aspx?direct=true&db=mnh&AN=17273659&site=ehost-live>. Accessed May 21, 2019.