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# IMMERSION PROGRAM IN LIFESTYLE MEDICINE AND ITS EFFECTS ON CARDIOVASCULAR RISK FACTORS

PROGRAMA DE INMERSIÓN EN MEDICINA DEL ESTILO DE VIDA Y SUS EFECTOS SOBRE LOS FACTORES DE RIESGO CARDIOVASCULARES

Abigail Ballone<sup>1</sup>

## ABSTRACT

**Introduction:** Cardiovascular diseases are the leading cause of death worldwide and are associated with increased morbidity and mortality by COVID-19. Lifestyle Medicine immersion programs consist of a residential internship that performs a multidisciplinary professional follow-up. **Objective:** To evaluate the effect of the residential lifestyle medicine program on risk factors for cardiovascular disease: weight, blood pressure and glycemia. **Methods:** Longitudinal, comparative study, with intervention of a Lifestyle Medicine Program. Retrospective data from 2019-2021 of patients who had completed the intervention for 14 days were used. This consisted of a comprehensive follow-up: medical, nutritional, psychological, physical and spiritual of the patients. **Results:** Of the 53 patients evaluated, 26 underwent the intervention before the pandemic, who were hospitalized with the main reason for weight loss 34.62%. Of the patients who underwent the intervention within the pandemic (N=27), the main reason for hospitalization was for treatment of chronic diseases 33.33%. Glycemia: Initial M=186.64, SD=81.73; Final M=119.93, SD=35.02. Mean reduction of 66.71 mg/dl, statistically significant (t=4.3460, p=0.0008). SBP: Initial M=127.76, SD=16.36; Final M=115.21, SD=14.87. Mean reduction of 12.55 mmHg, statistically significant (t=4.7048, p=0.0001). **Conclusions:** The effect of the intervention was significant in the cardiovascular risk factors evaluated: weight, glycemia and systolic blood pressure. It was possible to reduce the risk factors for cardiovascular disease with intensive lifestyle changes. In times of pandemic, the relevance of lifestyle medicine intervention is emphasized.

**Keywords:** Lifestyle, COVID-19, behavioral change.

## RESUMEN

**Introducción:** Las enfermedades cardiovasculares son la principal causa de muerte en el mundo y están asociadas con mayor morbimortalidad por COVID-19. Los programas de inmersión en Medicina del Estilo de Vida consisten en una internación residencial que realiza un seguimiento profesional multidisciplinario. **Objetivo:** Evaluar el efecto del programa residencial de medicina del estilo de vida sobre los factores de riesgo para enfermedad cardiovascular: peso, presión arterial y glucemia. **Métodos:** Estudio longitudinal, comparativo, con intervención de un Programa de Medicina del Estilo de Vida. Se utilizaron datos retrospectivos de 2019-2021 de pacientes que habían completado la intervención por 14 días. Esta consistió en un seguimiento integral: médico, nutricional, psicológico, físico y espiritual de los pacientes. **Resultados:** De los 53 pacientes evaluados, 26 realizaron la intervención antes de la pandemia, los cuales realizaron la internación con el motivo principal de pérdida de peso 34,62%. Los pacientes que realizaron la intervención dentro de la pandemia (N=27), el motivo principal de internación fue para tratamiento de enfermedades crónicas 33,33%. Glucemia: Inicial M=186,64, SD=81,73; Final M=119,93, SD=35,02. Reducción media de 66,71 mg/dl, estadísticamente significativa (t=4,3460, p=0,0008). PAS: Inicial M=127,76, SD=16,36; Final M=115,21, SD=14,87. Reducción media de 12,55 mmHg, estadísticamente significativa (t=4,7048, p=0,0001). **Conclusiones:** El efecto de la intervención fue significativa en los factores de riesgo cardiovascular evaluados: peso, glucemia y presión arterial sistólica. Fue posible disminuir los factores de riesgo para enfermedad cardiovascular con cambios intensivos en el estilo de vida. En tiempos de pandemia se enfatiza la relevancia de la intervención en medicina del estilo de vida.

**Palabras Clave:** Estilo de Vida, COVID-19, cambio conductual.

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## INTRODUCTION

The habits of modern life such as sedentary lifestyle, a diet rich in ultra-processed foods, disruption of the circadian rhythm, lack of vitamin D and high stress favor the development of metabolic syndrome<sup>(1)</sup>. Arterial hypertension, hyperglycemia, hyperlipidemia, and excess weight are among the main cardiovascular risk factors. Cardiovascular diseases are the leading cause of death in the world today<sup>(2)</sup>. On the other hand, these conditions have also been associated with increased morbidity and mortality for COVID-19 disease<sup>(3)</sup>.

It has been estimated that 31.1% of adults worldwide have hypertension, with the prevalence being higher in low and middle-income countries compared with high-income countries. This can be explained by the presence of risk factors for hypertension such as high sodium and low potassium intake, unhealthy diet, alcohol consumption, sedentary lifestyle and obesity<sup>(4)</sup>. Regular physical exercise, a plant-based diet low in sodium, control of stress, body weight and correction of the circadian rhythm directly influence blood pressure and are fundamental pillars in the treatment of this disease<sup>(5)</sup>.

The ACC/AHA guidelines make the recommendation (I-BR classification) that the diet should emphasize the intake of vegetables, fruits, legumes, nuts and whole grains to reduce the risk factors for atherosclerosis<sup>(6)</sup>. According to several studies, the lower the meat consumption, the lower the rates of hypertension<sup>(7)</sup>.

The prevalence of diabetes is also growing by leaps and bounds, and its incidence has tripled from 2000 to 2019, reaching 463 million by that year and an estimated 578 million by 2030<sup>(8)</sup>. Adults with this disease have a 2-to-4-fold increased risk of heart disease or stroke compared with those without diabetes<sup>(9)</sup>.

Lifestyle change has been shown to result in improvements in glycemic control in diabetic patients<sup>(10)</sup>. Whole food diets based on plants and minimally processed products improve insulin resistance, as well as promote healthy body weight<sup>(11)</sup>.

According to the World Health Organization (WHO), one in four adults do not get as much physical activity as they should<sup>(12)</sup>. Physical activity is a protective factor that decreases the risk of hospitalization, intensive care unit admission and death in COVID-19 infection<sup>(13)</sup>.

In the study by Aranda et al. sedentary lifestyle increased mortality in patients hospitalized with COVID-19 independently of other factors. That is, the

practice of regular physical activity, of moderate to intense intensity, seems to reduce COVID-19-related mortality<sup>(14)</sup>.

Currently, the prevalence of hypovitaminosis D has also increased in the population, because of working in closed environments and less contact with nature. The lack of this hormone with its immunomodulatory effect has also contributed to a weakened immune system. Consequently, guided and responsible treatment can be a favorable strategy to improve the immune system as well as chronic non-communicable diseases<sup>(15,18)</sup>.

The current lifestyle, coupled with the various situations brought about by the COVID-19 pandemic such as social isolation measures, teleworking, closure of gyms, parks, and increased emotional problems<sup>(19)</sup>, have led to the aggravation of major chronic noncommunicable diseases. For many people, intensive lifestyle medicine intervention is needed to improve cardiovascular risk factors and encourage continuation of a healthy lifestyle<sup>(20)</sup>.

The Lifestyle Medicine immersion program consisted of a residential inpatient stay with multidisciplinary professional follow-ups. The intervention consisted of a comprehensive plant-based diet, physical exercise, circadian rhythm adjustment, improved sleep quality, proper hydration, hydrotherapy, sun exposure, stress management, mental and spiritual wellbeing. All this with the aim of correcting and improving the main cardiovascular risk factors. Lifestyle changes have been shown to be more effective than medications in reducing atherosclerosis in patients with a healthy lifestyle over 5 years of follow-up<sup>(21)</sup>.

The goal of the study was to evaluate the effect of the residential lifestyle medicine program on risk factors for cardiovascular disease: weight, blood pressure, and blood glucose and to find out which is the main reason for hospitalization of patients before and after the COVID-19 pandemic.





## METHODS

### Design

Longitudinal, comparative study of intensive intervention in Lifestyle Medicine, parameters were assessed before and after the intervention.

### Population

All patients seen at the Vida Natural Clinic and Spa, in São Roque, São Paulo, Brazil, were included. Retrospective data from 2019-2021 of patients who had completed the Lifestyle Medicine intervention for 14 days were used.

### Intervention

In the Lifestyle Medicine intervention, patients were followed up medically, nutritionally, psychologically, physically and spiritually. The program included an integral plant-based diet, the patients had a physical exercise program with walks, exercises in the gym and hydrogymnastics, according to the individual needs of each patient. Relaxing massages and hydrotherapy sessions were also performed, since it has been hypothesized that hydrotherapy treatments applied frequently using alternating heat and cold are effective in increasing the immune system.

We also encouraged proper hydration during the day and sleep hygiene during the night, emphasizing lifestyle factors that increase sleep quality. In addition, outdoor activities in contact with nature such as walking, stretching and deep breathing sessions were performed. Patients had a daily moment of spiritual reflection and received educational talks aimed at encouraging continuity in the lifestyle changes initiated during the intervention.

The program was administered by health professionals such as doctors, nurses, nutritionists, psychologist, kinesiologist, physical therapist and pastor. There were different programs, all with the same treatment basis, but with different emphases according to the patient's expectations: program to treat chronic diseases (diabetes, hypertension, cancer, autoimmune diseases, etc.); osteoarticular rehabilitation program (to treat arthritis, osteoarthritis, herniated discs, etc.), with

special kinesiotherapeutic follow-up; emotional program (to treat anxiety, panic disorder, depression, chronic stress); addiction program (alcohol, tobacco, drugs and medication dependence); relaxation program (to rest and learn a new lifestyle) and weight loss program (overweight, obesity).

### Variables

The variables evaluated were the values of cardiovascular risk factors such as weight, blood pressure and glycemia. Baseline records were taken before starting the intervention program and at the end of the program.

### Statistical analysis

A paired-samples Student's t-test was performed to compare blood glucose levels reported in mg/dL. Weight, which is reported in kg, and systolic and diastolic blood pressure values, which are reported in mmHg, were compared. All comparisons were performed considering the values measured before and at the end of the residential intervention.

### Ethical Aspects

Institutional approval was obtained for the development of this study, the confidentiality and privacy of the participants was respected, as well as adherence to the guidelines of the Declaration of Helsinki for research on human subjects.

## RESULTS

Fifty-three patients were evaluated with 15 being men (28%) and 38 women (72%). Patients were classified according to whether they received the intervention before the pandemic (January 2019 to February 2020) or after the pandemic (March 2020 to March 2021), to see differences in the motives for hospitalization. Of the 53 patients, 26 underwent the intervention before the pandemic and 27 after the pandemic. The average age of the participants was 51.78 years (13-93 years). (Table 1)





**Table 1.** Characteristics of patients who received the intervention before and after the pandemic.

Variable	Total= 53
<b>Gender</b>	
Female	38 (72%)
Male	15 (28%)
<b>Pre-pandemic intervention</b>	26 (49,06%)
<b>Post-pandemic intervention</b>	27 (50,94%)
<b>Age</b>	51,78 (13-93)
<b>Smokers</b>	
Yes	8%
Ex-smokers	15%
No	77%
<b>Alcohol</b>	
Occasional	8%
Drinkers	17%
Non-drinkers	75%

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Of the patients who underwent the intervention, 8% were current smokers, 15% were ex-smokers and 77% had never smoked. Regarding alcohol use, 8% were occasional drinkers, 17% were current drinkers and 75% did not drink alcohol. (Table 1)

pandemic (N=26), the main reason for hospitalization was for weight loss 34.62% (N=9); secondly to treat chronic diseases 30.77% (N=8); thirdly to treat emotional health 19.23% (N=5); fourthly for rehabilitation 7.69% (N=2) health; 12.5% (N=1) for weight loss and 12.5% (N=1) for addictions.

In patients who underwent the intervention before the

**Table 2.** Main reason for hospitalization of patients before the pandemic and after the pandemic.

Reason	Before the pandemic (Total=26)	After the pandemic (Total=27)
Weight loss	9 (34,62%)	4 (14,81%)
Treating chronic illness	8 (30,77%)	9 (33,33%)
Emotional health	5 (19,23%)	3 (11,11%)
Rehabilitation	2 (7,69%)	2 (7,41%)
Rest	2 (7,69%)	2 (7,41%)
Addictions	-	7 (25,93%)

Of the patients who performed the intervention after the pandemic (N=27), the main reason was: 33.33% (N=9) to treat chronic diseases; secondly, 25.93% (N=7) for addictions; thirdly, 14.81% (N=4) to lose weight; fourthly, 11.11% (N=3) to treat emotional health; fifthly, 7.41% (N=2) for rehabilitation and sixthly, 7.41% (N=2) to rest (Table 2). Of the total patients (N=27), 37.04% came with a second reason which was: 50% (N=5) to treat emotional health; 30% (N=3) to lose weight; 10%

(N=10) for addictions and 10% (N=1) to treat chronic diseases. Glycemia: Initial M=186.64 mg/dl, SD=81.73; Final M=119.93 mg/dl, SD=35.02. Mean reduction of 66.71 mg/dl, statistically significant (t=4.3460, p=0.0008). (Table 3)

SBP: Initial M=127.76 mmHg, SD=16.36; Final M=115.21 mmHg, SD=14.87. Mean reduction of 12.55 mmHg, statistically significant (t=4.7048, p=0.0001). (Table 3)



**Table 3.** Risk Factors before and after the pandemic

Risk factors	Baseline	Final	Mean reduction	p
Weight (kg)			3,57	0,0001
SBP (mmhg)	127,76	115,21	12,55	0,0001
DBP (mmhg)	81,10	78,67	2,43	0,1596
Glycemia (mg/dl)	186,64	119,93	66,71	0,0008

## DISCUSSION

A statistically significant difference was found in the reduction of weight, glycemia and systolic blood pressure values at the end of the intervention.

No statistically significant difference was found between diastolic blood pressure before and after the intervention, however there was a decrease in diastolic blood pressure.

The practice of physical activity as part of the intervention was fundamental to improve cardiovascular risk factors and overall health.

In a study done during the first wave, it was observed that sedentary patients have worse outcomes in the face of COVID-19 infection and may have complications added to pre-existing comorbidities, unlike patients who are active or who engage in regular physical activity<sup>(14)</sup>.

In another study of 48,440 patients, it was observed that patients with COVID-19 who were physically inactive had a higher risk of hospitalization (OR 2.26; 95% CI 1.81 to 2.83), admission to the ICU (OR 1.73; 95% CI 1.18 to 2.55) and death (OR 2.49; 95% CI 1.33 to 4.67) compared to patients who were physically active<sup>(13)</sup>. Important data with which the evolution and prognosis of some patients could be presumed. Therefore, it is important to promote the regular practice of physical activity in order to reduce the risk of complications in case of a possible infection.

As part of the intervention, a whole food diet based on plants, which contributes to the reduction of weight, glycemia and blood pressure, was also carried out. These diets are abundant in fiber, which maintains a balanced microbiota, are rich in phytonutrients and low

in saturated fats, advanced glycation end products and nitrosamines<sup>(11)</sup>.

Hydrotherapy treatments with the application of cold and heat, carried out during hospitalization, contributed to a better functioning of the immune system. Ramirez, et. al. proposes them as the first line approach in the prevention and treatment of mild Coronavirus infections since the virus is susceptible to high body heat<sup>(22)</sup>.

The main reason for hospitalization during the pandemic was to treat chronic diseases, which is very important to avoid complications in case of COVID-19. One study showed that patients with preexisting chronic comorbidities such as hypertension, diabetes, cardiovascular disease, and chronic kidney disease were at increased risk of developing severe COVID-19. In addition, acute cardiac and renal injury were found to lead to increased risk of COVID-19-related mortality<sup>(3)</sup>.

During the pandemic was seen an increase in hospitalisations for the reason of addictions. The pandemic has aggravated alcohol consumption in those who were already using this substance. According to the study conducted by the Pan American Health Organization (PAHO), in which more than 12,000 adults from 33 Latin American countries participated, during the pandemic, 32% of the sample reported at least one instance of episodic heavy drinking. This type of consumption was more prevalent among the youngest respondents<sup>(23)</sup>.

Given the severity of COVID-19 involvement in patients with comorbidities, it is essential to promote a healthy lifestyle that includes regular physical activity,





plant-based diet, circadian rhythm balance, stress management, contact with nature and spiritual development.

Among the limitations of the study are that there was no comparison group, so it could not be proven whether or not the program could be superior to others; in addition to the limited sample that was available. However, the results are important to know the effect that the evaluated intervention may have on cardiovascular risk factors.

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## CONCLUSION

The intervention was effective in the cardiovascular risk factors evaluated, such as weight, glycemia and systolic blood pressure, reaching statistical significance. We conclude that it is possible to reduce the risk factors for cardiovascular disease with intensive lifestyle changes. In times of pandemic, this type of intervention in lifestyle medicine is necessary to improve the quality of life and avoid possible complications in case of infection.

**Conflicts of interest:** The author declares that she has no conflicts of interest.

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## REFERENCES

1. Kataria I, Chadha R, Pathak R. Dietary and lifestyle modification in metabolic syndrome: a review of randomized control trials in different population groups. *Reviews in health care*. 2013; 4(4): pp. 209-230. DOI: <https://doi.org/10.7175/rhc.v4i4.667>
2. World Health Organization. Cardiovascular diseases. Prevention and control of cardiovascular disease [Internet]. Available at: [https://www.who.int/cardiovascular\\_diseases/es/](https://www.who.int/cardiovascular_diseases/es/)
3. Wang X, Fang X, Cai Z, et al. Comorbid Chronic Diseases and Acute Organ Injuries Are Strongly Correlated with Disease Severity and Mortality among COVID-19 Patients: A Systemic Review and Meta-Analysis. *Research (Wash D C)*. 2020 Apr 19; 2020 epub 2402961. doi: 10.34133/2020/2402961.
4. Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. *Nat Rev Nephrol*. 2020 Apr;16(4):223-237. doi: 10.1038/s41581-019-0244-2.
5. Valenzuela PL, Carrera-Bastos P, Gálvez BG, et al. Lifestyle interventions for the prevention and treatment of hypertension. *Nat Rev Cardiol* 18, 251-275 (2021). DOI: <https://doi.org/10.1038/s41569-020-00437-9>
6. Arnett DK, Blumenthal RS, Albert MA, et al., 2019 ACC/AHA Guideline on the Primary Prevention of Cardiovascular Disease: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. *Circulation*. 2019 Sep 10;140(11): e596-e646. DOI: 10.1161/CIR.0000000000000678.
7. Alexander S, Ostfeld RJ, Allen K, et al. A plant-based diet and hypertension. *Journal of geriatric cardiology: JGC*. 2017. 14(5), 327-330. DOI: <https://doi.org/10.11909/j.jissn.1671-5411.2017.05.014>
8. International Diabetes Federation. IDF diabetes atlas, 9th edn. Brussels, Belgium. 2019. [Internet]. Available from: <https://www.diabetesatlas.org>
9. Yokoyama Y, Barnard ND, Levin SM, et al. Vegetarian diets and glycemic control in diabetes: a systematic review and meta-analysis. *Cardiovascular diagnosis and therapy*. 2014. 4(5): pp: 373-82. DOI: 10.3978/j.issn.2223-3652.2014.10.04.
10. Johansen MY, MacDonald CS, Hansen KB, et al. Effect of an intensive lifestyle intervention on glycemic control in patients with type 2 diabetes: A Randomized Clinical Trial. *JAMA*. 2017 Aug 15;318(7):637-646. DOI: 10.1001/jama.2017.10169.





11. McMacken M, Sapana S. A plant-based diet for the prevention and treatment of type 2 diabetes. *Journal of geriatric cardiology: JGC*. 2017. 14(5):pp:342-354. DOI: 10.11909/j.issn.1671-5411.2017.05.009
12. United Nations. WHO releases guide to combat sedentary lifestyles, which kills up to 5 million per year. [Internet]. [Cited November 27, 2020]. Available at: <https://news.un.org/pt/story/2020/11/1734322>
13. Sallis R, Young DR, Tartof SY, et al. Physical inactivity is associated with a higher risk for severe COVID-19 outcomes: a study in 48 440 adult patients. *British Journal of Sports Medicine* 2021;55: 1099-1105. DOI: 10.1136/bjsports-2021-104080
14. Salgado-Aranda R, Pérez-Castellano N, Núñez-Gil I, et al. Influence of basal physical activity as a modifying factor in COVID-19 mortality: A single-center retrospective study. *Infect Dis Ther* 10, 801-814 (2021). DOI: <https://doi.org/10.1007/s40121-021-00418-6>
15. Rosas-Peralta M, Holick MF, Borraro-Sánchez G, et al. Dysfunctional immunometabolic effects of vitamin D deficiency and increased cardiometabolic risk. Potential epidemiological alert in America? *Endocrinol Diabetes Nutr*. 2017;64(3):162-173. DOI: <http://dx.doi.org/10.1016/j.endinu.2016.11.009>
16. Miñambres I, Leiva A, Pérez A. Hypovitaminosis D and metabolic syndrome. *Medicina Clínica*. 2014. 143(12): pp: 542-547. DOI: <https://doi.org/10.1016/j.medcli.2013.12.012>
17. Zittermann A, Iodice S, Pilz S, et al. Vitamin D deficiency and mortality risk in the general population: A meta-analysis of prospective cohort studies. *Am. J. Clin. Nutr*. 2012; 95:91-100. DOI: <https://doi.org/10.3945/ajcn.111.014779>
18. Meltzer DO, Best TJ, Zhang H, et al. Association of vitamin D status and other clinical characteristics with COVID-19 test results. *JAMA Network Open*. 2020; 3 (9): e2019722. DOI: 10.1001/jamanetworkopen.2020.19722.
19. Khan KS, Mamun MA, Griffiths MD, et al. The Mental Health Impact of the COVID-19 Pandemic Across Different Cohorts. *Int J Ment Health Addiction* (2020). DOI: <https://doi.org/10.1007/s11469-020-00367-0>
20. Mechley AR, Dysinger W. Intensive Therapeutic Lifestyle Change Programs: A progressive way to successfully manage health care. *American journal of lifestyle medicine*. 2015;9(5):354-360. DOI:10.1177/1559827615592344
21. Ornish D, Scherwitz LW, Billings JH, et al. Intensive lifestyle changes for reversal of coronary heart disease. *JAMA*. 1998 Dec 16;280(23):2001-7. DOI: 10.1001/jama.280.23.2001.
22. Ramirez FE, Sanchez A, Pirskanen AT. Hydrothermotherapy in the prevention and treatment of mild to moderate cases of COVID-19. *Medical Hypothesis*. 2021. 146. DOI: <https://doi.org/10.1016/j.mehy.2020.110363>
23. Garcia-Cerde R, Valente JY, Sohi I, et al. Alcohol consumption during the COVID-19 pandemic in Latin America and the Caribbean. *Rev Panam Salud Publica*. 2021; 45: e52. DOI: <https://doi.org/10.26633/RPSP.2021.52>

