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Research Article

Metabolic and Weight Effects in Acute Lifestyle Changes

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Abstract

The aim of this study was to evaluate clinical and laboratory results found in the database of an institution for the prevention, promotion and recovery of health. Clinical and laboratory parameters were observed during the examination of 458 medical records of patients who underwent a clinical program of acute lifestyle intervention, and what changes were produced by this treatment. The clinical parameters evaluated were body weight and waist circumference. In the statistical analysis, with statistical significance ($p<0.05$), there was an improvement in the biochemical indices studied in both groups, especially in the group with longer permanence, improvement in body weight, and there was also a significant improvement ($p<0.05$) in those with metabolic syndrome, among whom approximately 36% no longer had this condition. Acute lifestyle intervention reduced or reversed risk factors for coronary artery disease and the presence of metabolic syndrome.

Keywords: lifestyle; metabolism; weight reduction; diet; exercise

Abbreviations:

HDL: High Density Lipoprotein

LDL: Low Density Lipoprotein

Presentation:

This study presents the results of laboratory and anthropometric changes found in a series of patients submitted to what we call "Acute Lifestyle Intervention", under hospitalization in an institution for prevention, promotion and maintenance of health. It intends to offer the possibility of a new form of therapeutic approach that seeks to implement changes in the patients' lifestyle through short and repeated interventions, aiming to restore to them the natural capacities and qualities of organic-physiological regulation.

Introduction:

Lifestyle is an expression that encompasses a huge range of behaviors and attitudes of an individual, or of a society. Cultural, social, psychological, genetic, environmental, educational, historical, geographical, political, media, market, and other factors combine and have the power to boost or induce the behavior of human beings, leading them to make choices and options that are often automatic and unreflective. In a certain aspect, subtracting from this being the attribute that makes it so prominent in the history of life: free will. In the evolution of life, the human being has been supplied with a specialized capacity, superimposed on that of any other species, which is to interact with the environment, his fellow beings and other species, to form his own judgment about himself and these relationships, being able to decide on which behaviors suit him and follow them, or not, if he so wishes.

However, in the last century, with the advent of factors and trends such as economies of scale, market economy, consumer society, social urbanization, among others, human beings have adopted a lifestyle that puts their health and life itself at risk, creating environmental conditions for genes that were previously inexpressible to have an expression that was inappropriate for life.

In this way, we often find ourselves taking actions, making choices that we cannot reflect on. So, we become a society that ingests alcohol in excess, that becomes addicted to habits such as smoking, that acquires products without awareness of the harms, and even the benefits they can bring, that eats food of poor quality and in unthinkable quantities.

Thus, this society has become hypertensive, obese, diabetic, dysmetabolic and atherosclerotic.

In view of this finding, it is essential that, in addition to technological development to support and treat human health problems, the scientific and academic communities are willing to study the theme and propose conducts, policies, helping to shape lifestyles in human societies that are adequate to life.

Several observations have been made since the 1970s, which clearly demonstrate the relationship between lifestyle habits, such as diets, and the incidence of degenerative diseases and mortality from cardiovascular diseases. As published in 1979 by Levy et al.: "Nutrition, Lipids and

Coronary Heart Disease" based on data collected in twenty countries, the correlation between mortality from coronary artery disease and calorie intake from various types of food was strongly positive when such calories were extracted preferably from foods such as: butter (0.546), eggs (0.592), beef and poultry (0.501), sugar (0.676) and negative when coming from grains, fruits, vegetables and legumes (-0.633). In other words, as the percentage of calories extracted from plant foods increased, the mortality rate from coronary heart disease decreased, based on data collected in twenty countries [1].

Results of several studies carried out, such as: Seven Countries, Eighteen Countries, Twenty Countries, Four Countries and Ni-Hon-San Studies, demonstrated that populations with high intakes of total fat, saturated fat, cholesterol, and sugar in the diet, had increasing mortality rates from cardiovascular disease, as well as high prevalence of obesity, hypercholesterolemia and diabetes mellitus. The reverse also proved to be true.

In Brazil, understanding the problem that inadequate lifestyle habits produce in terms of morbidity and mortality, and following the guidance of the Third National Cholesterol Education Program (NCEP) - Adult Treatment Panel III (ATP III) [2], the Brazilian Society of Cardiology, through the Department of Atherosclerosis, as published in the Update of the Brazilian Guideline on Dyslipidemias and Prevention of Atherosclerosis - 2017 [3], it recognizes the important role of lifestyle modification as a fundamental measure in the prevention and treatment of dyslipidemias, atherosclerosis and obstructive arterial diseases, recommending efforts to achieve the establishment of lifestyle habits that are more appropriate to health.

Aims:

In view of the great need for approaches that guide and support individuals and society in the adoption of lifestyles that modify the current trends of deterioration of health, especially in the cardiovascular system, and considering the form of action of the Lapinha Medical Spa model (Paraná, Brazil), this study aimed to observe how the acute action in lifestyle modification could influence the metabolic and clinical aspects of the individuals submitted to the cardiovascular system and to question whether acute and repeated interventions can cause changes in the behavior of individuals in the medium and long term.

Literature review:

The following are recognized as risk factors for arterial atherosclerosis and obstructive arterial disease: 1) dyslipidemia; 2) diabetes mellitus; 3) smoking; 4) systemic arterial hypertension; 5) age greater than or equal to 45 years for men and equal to or greater than 55 years for women, and 6) history of atherosclerosis in a first-degree relative, less than 55 years for men and less than 65 years for women. This definition is approved by the Brazilian Guidelines on Dyslipidemias and the Guideline for the Prevention of Atherosclerosis of the Department of Atherosclerosis of the Brazilian Society of Cardiology [3]. Conditions such as: elevated plasma homocysteine levels; changes in coagulation factors, such as increased plasma fibrinogen; increased plasma level of ultrasensitive C-reactive protein; sedentary lifestyle and obesity.

Among the six patent risk factors, four of them are related to society's way of living (lifestyle). They can be triggered, maintained or even aggravated by the attitudes taken by the human being and his modus vivendi. Thus, habits such as smoking, excessive salting, processed foods or excess carbohydrates and/or fats can accentuate individual tendencies of onset and progression of arterial atherosclerosis, which has long been recognized as a primary factor in the development of most obstructive arterial diseases and, consequently, the main responsible for mortality in Western societies [4,5,6].

Long-standing data available, such as: 1) individuals, even if they are intense smokers, have reduced their risk of experiencing coronary events by half when they have abolished the smoking habit when compared to those who have not [7,8]; 2) for each plasma increase of 10 mg/dl in total cholesterol, there is a 9% increase in cardiovascular mortality and a 5% increase in overall mortality [4,5], or even, mortality due to coronary artery disease was almost four times higher in individuals whose total cholesterol was 264 mg/dl, when compared to those who maintained the level at up to 182 mg/dl [9,10]; 3) the 6 mmHg decrease in blood pressure was accompanied by a reduction in the risk of stroke and coronary events by 42% and 24%, respectively, both conditions being strongly linked to arterial atherosclerosis [11,12,13]; and, finally, 4) the role of diabetes in the production and progression of atherosclerosis, as well as the disturbance in glucose metabolism called insulin resistance or glucose intolerance [5,14], clearly demonstrate the role of lifestyle habits in the genesis of atherosclerotic disease and its potential preventability.

Obesity, especially in its abdominal or visceral form, is closely related to three of the four factors mentioned above, namely: dyslipidemia, hypertension and diabetes. Although it is not recognized as a risk factor (causal agent) but as a risk marker (associated with higher risk, but without established causality), obesity, due to its relationship with factors that have well-established causality, plays an important role in the genesis, maintenance and progression of atherosclerosis and its consequences [15].

Weight gain has been considered a public health problem worldwide, not exempting rich countries or those considered "developing", such as Brazil. In the United States, in the 1960s, the prevalence of obesity was 24%, while in the 1990s this prevalence jumped to 35%. In Brazil, data from the Ministry of Health indicate a prevalence of 32% for overweight and 8% for obesity [16,17].

According to observations and recommendations from the US National Heart, Lung, and Blood Institute, all people with a body mass index greater than or equal to 25 kg/m.m (weight, in kilograms, divided by the square of the height, in meters) are at increased risk of cardiovascular disease [5]; the mortality rate increases exponentially as the body mass index exceeds 30, the point that delimits the conditions of overweight and obesity [17]. The simple measurement of abdominal circumference, which should be taken at the height of the umbilical scar, with the patient in an upright position and at the end of expiration, stands out as a qualifier of weight and/or fat concentration. This measurement indicates an increased risk for high blood pressure, diabetes mellitus, dyslipidemia and cardiovascular disease in men when greater than 94 cm and a much greater risk when greater than 102 cm; and in women, an increased risk for measurements greater than 80 cm and a much greater risk when greater than 88 cm.

More recently, the conjunction of multiple conditions that confer a higher risk of atherosclerosis and obstructive arterial diseases has been recognized, whose most accepted name is Metabolic Syndrome, having in the recent past received several names, according to the authors who described it: Plurimetabolic Syndrome (Crepaldi), Syndrome X (Reaven), Insulin Resistance Syndrome (De Fronzo and Haffner), Mortal Four (Kaplan).

An individual is recognized as having Metabolic Syndrome [2] when he or she has three or more of the factors listed in the table below:

METABOLIC SYNDROME	
DIAGNOSIS WITH THREE OR MORE OF THE CRITERIA BELOW	
Risk Factor	**Defined Levels**
Abdominal circumference Male	> 102 cm

Female	> 88 cm
Triglycerides	≥ 150 mg/dL
HDL cholesterol Male Female	 < 40 mg/dL < 50 mg/dL
Blood pressure	≥ 130 / ≥ 85 mmHg
Fasting glucose	≥ 110 mg/dL

Source: Third National Cholesterol Education Program - Adult Treatment Panel III, 2001 [2].

The literature has presented successful attempts to modify lifestyle by positively altering the natural history of diseases, as well as preventing the emergence of others. Some publications clearly demonstrate the benefits of lifestyle interventions in diverse populations and in the most varied settings [18,19,20].

In 2002, Knowler et al. published the results of a clinical trial in which 3,234 individuals with alterations in fasting and postprandial blood glucose, but not diabetic, overweight or obese, were randomized to the following interventions: use of placebo and mild lifestyle intervention; use of metformin and the same lifestyle changes; and a third group in which only an intense lifestyle intervention program was established. The results achieved, after two years and ten months, on average, demonstrated established diabetes incidences of 11%, 7.8%, and 4.8%, respectively for the placebo, metformin, and lifestyle intervention groups. To prevent a case of diabetes mellitus, 6.9 people had to be treated intensively for lifestyle habits, and 13.9 people using metformin. The incidence of diabetes was 58% lower in the intense modification group, and 31% lower in the group using metformin, when compared to the placebo group. And finally, the incidence of diabetes was 39% lower in the lifestyle intervention group than in the metformin group [21].

The reported data are in line with others previously presented in similar trials conducted in China and Finland [22,23]. Stampfer et al. reported results from the follow-up of approximately 84,000 women, from 1980 to 1992, in which there was a clear relationship between lifestyle changes and decrease or increase in coronary heart disease, depending on the content of the changes [24]. Smoking cessation explained a decrease of 13%, the improvement in diet quality caused a decrease of 16%, while the increase in body mass index beyond 25, which had occurred in 38% of the participants, increased the incidence of the disease by 8%.

It was also found that 82% of the coronary events that occurred in the reported period, which totaled 1,128 cases, were related to non-adherence to the recommended lifestyle program, which consisted of using a diet rich in cereal fiber, Omega-3 fatty acids, folate, prevalence of polyunsaturated fatty acids over saturated ones, regular exercise for at least 30 to 60 minutes a day, and abstention from smoking.

A lifestyle intervention study conducted in Finland by Tuomilehto et al., involving 522 individuals with obesity and glucose metabolism disorders (glucose intolerance), was efficient in preventing the onset of diabetes mellitus in the group randomized to intervention: at the end of four years of follow-up, the incidence of diabetes was 11% in this group and 23% in the control group. A 58% decrease in the risk of developing diabetes mellitus, and a 63% lower incidence of the disease [23].

In a review article, Kromhout et al. [25] analyzed cross-cultural studies such as: The Seven Countries Study [26]; WHO-MONICA [27]; and others [28] of prospective observation (Cohort) and intervention, such as the Framinghan Heart Study. Two more important prospective cohort studies are mentioned: Multiple Risk Factor Intervention Trial - MRFIT, Chicago Heart Association Detection Project in Industry - CHA [28] and Nurses Health Study [24]. In all of them, there is clear evidence of a positive relationship between adequate lifestyle and lower incidence of coronary atherosclerotic disease. However, they highlight the importance of conducting better controlled studies with well-defined evaluation objectives.

In a controlled clinical trial conducted in Oslo, 1,232 men aged between 40 and 49 years, 80% of them smokers, hypercholesterolemic and with systolic blood pressure less than 150 mmHg, randomized to a control group and dietary and anti-smoking counseling only, the difference from

47% to less than the sum of all infarctions, fatal and non-fatal, was clear.

and sudden death [29]. Another review involving five primary and secondary intervention and prevention studies showed that an average decrease of 13% in plasma cholesterol levels was accompanied by a 30% reduction in major coronary events and an 11% reduction in all-cause mortality [30].

At a 46-month follow-up, the Lyon Diet Heart Study found a decrease in myocardial infarction and all-cause mortality by 65% and 56%, respectively [30]. In this intervention, a typical Mediterranean diet enriched with alpha-linolenic fatty acid was used [31].

Two other studies evaluating the results produced by adherence to typical local diets were published and clearly showed benefits obtained as primary and secondary prevention for vascular diseases.

Singh et al. published the results of a secondary prevention study in India, which followed 1,000 participants randomized to a normal diet in that region of Asia, that is, basically vegetarian and comparable to phase I of the diet recommended by the National Cholesterol Education Program, and intervention group, which ingested more vegetables, legumes, fruits, nuts and whole grains, in a little more than double, as well as the intake of alpha-linolenic fatty acid was twice as high in the intervention group, when compared to the control group. The total number of cardiac events in the two-year follow-up period was lower in the intervention group than in the control group that received the Indo-Mediterranean diet (39 versus 78 events); sudden death also showed the same trend (6 versus 16), as well as myocardial infarction (21 versus 43) [32].

The typical Mediterranean diet was put to the test in Greece in a prospective study, involving 22,043 adult individuals, with a follow-up for an average of 44 months. A high degree of adherence to the recommended diet showed an inverse relationship with mortality from cardiovascular disease, at a rate of 0.67, and even mortality from cancer, at a rate of 0.76 [33].

The Dietary Approaches to Stop Hypertension (DASH) study showed that it is possible to obtain significant decreases in blood pressure with dietary intervention, equivalent to those obtained in clinical trials using drugs and presumably in the harmful consequences of hypertension [34].

Smoking cessation in 36% of patients with heart disease due to coronary artery disease leads to a 30% reduction in cardiovascular mortality [35].

Espósito et al. published the results of a randomized study in which the intervention group was instructed to maintain a typical Mediterranean diet, while the control group remained on a diet, they called prudent, for approximately two years. At the end of the study, the intervention group had a lower incidence of metabolic syndrome and a considerable improvement in indices that point to cardiovascular risk, compared to the control group [36].

And, finally, Ornish et al. [37] demonstrated that after five years of follow-up, a group submitted to an intensive lifestyle modification program showed an improvement in the diameter of previous coronary artery stenosis by 7.9%, while in the control group there was an

accentuation of stenosis in 27.7%. The risk index for coronary events in the control group, compared to the experimental group, was 2.47%. In this study, the intervention consisted of a strictly vegetarian diet, with 10% of energy coming from fats, regular and frequent aerobic exercises, and training for stress management; smoking cessation and social support.

Although there is abundant scientific documentation proving that the adoption of a lifestyle that is careful with individual and social health produces very positive effects, reducing morbidity and mortality due to cardiovascular diseases, and even general, the issue of implementing new and good habits remains a great challenge. The adoption of suggested or advised dietary patterns is not always achieved [31]. The practice of regular movement or even guided exercises, although desired by society, is very difficult by the comforts of modernity; the high consumption of processed foods is increasingly encouraged; smoking, although condemned today, continues to be widely used, especially among young people. Nevertheless, as a consumer society, we seek in the thin standard the image of beauty and vitality, we produce more and more obesity, with the prevalence of this condition, and of overweight, almost doubled in most industrialized countries and also in those "developing". However, even small changes in behavior can provide great benefits, as occurs in obese people in whom the loss of 5% of body weight shows improvement in vascular risk and coexisting disorders [38]. Hence the importance of developing efforts in all senses and fields to reestablish the possibility for individuals to adopt appropriate behavior patterns for health.

Material and Methods:

Lapinha Medical Spa is a clinical, prevention, promotion and restoration of health institution operating since 1972, in the municipality of Lapa, Paraná, Brazil. Its mission is: "to provide integral health through natural processes, using modern therapeutic techniques, personalized medical care programs, services, information and products specially developed for an adult audience".

In a rural environment, it offers a type of care that has been notable in several countries of central Europe since the first half of the last century, and which aims to reestablish in individuals a more natural lifestyle that is appropriate to the maintenance of vital functions. It aims to provide clinical improvement in the short term and establish healthy lifestyle goals in the medium and long term.

Its intervention is based on the placement of individuals in a program of directed and controlled habits:

- ovo-lacto-vegetarian diet, with skim milk and egg yolk within the nutritional standards of less than 200 mg/day of cholesterol;
- daily physical exercise, predominantly aerobic, and average caloric expenditure of 400 to 800 Kcal/day;
- well-established bedtime and rest, with 9:30 p.m. as the limit for wakefulness and encouraging the practice of afternoon naps;
- well-established and early wake-up time, stimulating awakening to 06:00 hours or, at most, 07:30 hours;
- meal times established and complied with, with breakfast served at 8:00 am, lunch at 12:00 pm, snack at 3:30 pm and dinner at 6:00 pm;
- application of body therapies, such as hydro and physiotherapy;
- stimulation of social coexistence through meetings, discussion groups, informative colloquia and recreational activities;
- encouragement to the exercise of spirituality with weekly meditation, with guidance in the Judeo-Christian faith, and guidance for the individual search for the rescue of the spiritual dimension.

Patients who undergo this program are monitored by a multidisciplinary team composed of doctors, nutritionist, physiotherapist, physical educators and advisors.

The immersion in the "Lapinha lifestyle" takes place in a minimum period of one week, with a stay of three weeks being indicated as ideal.

After the intervention periods, patients receive a formal recommendation on how to add behaviors that replace those identified as undesirable.

During the immersion, in which the experience lived is evaluated as positive, restorative and recuperative, individuals receive information that complements a pedagogical cycle. It is learning through the binomial: experiential experience and conceptual sedimentation.

Laboratory data and clinical parameters from the Lapinha Medical Spa database were evaluated in two distinct series.

In the first of them (Group I), 262 medical records of patients who underwent laboratory tests were selected. A total of 83 patient records with incomplete data were excluded, and 179 remained in the final sample, on which the observations were made. In this first sample, we studied biochemical changes (total cholesterol, low-density lipoprotein fractions - LDL and high-density lipoprotein -HDL cholesterol, triglycerides, uric acid) and clinical changes (changes in weight, body mass index, blood pressure). The medical records were selected from among those of patients who had seven days of treatment at the clinic in a period of one year.

Also in the first group, individuals who, during the period comprised, underwent the proposed treatment more than once, were identified, and the evolution of body weight was verified on them.

In the second sample (Group II), 332 medical records of patients who remained in treatment for ten days or more (mean of 14.27 days) were selected, and 53 of these were cleared because they did not present laboratory tests at entry and exit, thus resulting in 279 medical records on which statistical studies were established. In this second series, biochemical observations were made (total cholesterol and its HDL and LDL fractions, triglycerides and uric acid) and anthropometric data were collected. Individuals classified as having metabolic syndrome were identified in this second group, and the evolution of this condition was observed over the period. In this group, the medical records were selected from among patients who had been undergoing treatment for a period of three years.

The biochemical parameters: total cholesterol, HDL-cholesterol, triglycerides, glycemia and uric acid were determined by enzymatic method. The LDL fraction of cholesterol was determined by Friedewald's formula [39].

The sample for examination was collected fasting, on the morning of the first day of the intervention and on the last day of the stay.

For the determination of Metabolic Syndrome, the criteria determined by the Executive Summary of the Third Report of the National Cholesterol Education Program Expert Panel on the Detection, Evaluation and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III) were used [3].

Since it was impossible to collect all the clinical parameters in the two samples, this study was not willing to perform qualitative comparisons of those parameters between the different groups, and these comparisons were made regarding the biochemical data, namely: fasting glucose, total cholesterol, LDL and HDL-cholesterol fractions, triglycerides and uric acid, and comparisons were made between Group I, the one in which the patients remained seven days in the program, and Group II, the one in which the patients remained at least ten days in the lifestyle intervention program.

Results:

The results of the statistical study of plasma glucose in the two Groups (I and II) at the time of entry and exit are presented in Table 1.

Through the analysis of variance with repeated measures, we observed that the groups did not present a difference in behavior (p=0.9771), did not differ in relation to their means in the pre and post (p=0.9114). The

two groups decreased significantly over the course of the evaluations (p<0.001).

GROUP	N Obs	Variable	N	Average	Standard deviation	Minimal	Maximum
≤ 7 days	178	GLIC_1	178	90,37	27,16	71,00	351,00
		GLIC_2	178	84,56	14,22	70,00	212,00
≥ 10 days	312	GLIC_1	312	90,53	23,09	61,00	258,00
		GLIC_2	312	85,37	18,25	55,00	194,00

Table 1: Comparison of Groups I (≤ 7 days) and II (≥ 10 days) regarding the study of plasma glucose level.

*: Variable parsed with log transformation.

Tables 2 to 4 present the results of the study of plasma cholesterol and its HDL and LDL fractions, in the two Groups (I and II), at the time of entry and exit.

GROUP	N Obs	Variable	N	Average	Standard deviation	Minimal	Maximum
≤ 7 days	179	COL_1	179	226,30	36,38	144,00	419,00
		COL_2	179	215,13	33,95	144,00	411,00
≥ 10 days	312	COL_1	312	227,34	43,88	120,00	369,00
		COL_2	312	206,08	38,82	107,00	321,00

Table 2: Comparison of Groups I (≤ 7 days) and II (≥ 10 days) regarding the study of the plasma level of total cholesterol.

*: Variable parsed with log transformation. Through analysis of variance with repeated measures, we observed that the groups presented a difference in behavior (p<0,001).

The ≤ 7-day group decreased significantly (p<0.001) and the ≥ 10-day group also decreased (p<0.001). We observed through the averages that the group with ≤ 7 days decreases 4.94% and the group ≥ 10 days decreases 9.35%.

Through the analysis of variance with repeated measures, we observed that the groups did not show any difference in behavior (p=0.8816), did not differ in relation to their means in the pre and post (p=0.4664). Both groups grew significantly over the course of the evaluations (p<0.001).

Through the analysis of variance with repeated measures, we observed that the groups presented a difference in behavior throughout the evaluations performed (p<0.001). Both the 7 ≤ day and ≥ -10-day groups showed a significant decrease in LDL (p<0.001).

Table 5 shows the relative variation in plasma LDL-cholesterol levels between the two groups (I and II).

Analyzing the delta % variation using the non-parametric Mann-Whitney test, we observed that the 10-day group had a significantly higher delta decrease than the 7-day group (p<0.001).

GROUP (I) ≤ 7 DAYS						
Variable	**N**	**Average**	**Standard deviation**	**Median**	**Minimal**	**Maximum**
LDL	175	-6,70093	7,50893	-6,42202	-39,68254	42,88793
GROUP (II) ≥ 10 DAYS						
Variable	**N**	**Average**	**Standard deviation**	**Median**	**Minimal**	**Maximum**
LDL	300	-10,4533	14,69108	-8,61511	-64,03846	48,62385

Table 5: Variation of LDL cholesterol between Groups I (≤ 7 days) and II (≥ 10 days) relative to the percentage delta (LDL2-LDL1)/LDL1*100).

Table 6 presents the statistical results of plasma triglyceride levels at the entry and exit times of the two groups studied (I and II).

Through analysis of variance with repeated measures, we observed that the groups presented a difference in behavior (p<0.001).

The 7 ≤ day group decreased significantly (p<0.001) and the 10 ≥ day group also decreased (p<0.001). We observed through the averages that the group with ≤ 7 days decreases 9.02% and the group ≥ 10 days decreases 17.35%.

GROUP	N Obs	Variable	N	Average	Standard deviation	Minimal	Maximum
≤ 7 days	179	TRIG_1	179	163,93	51,56	106,00	402,00
		TRIG_2	179	149,15	45,14	56,00	356,00
≥ 10 days	312	TRIG_1	312	168,83	79,33	67,00	739,00
		TRIG_2	312	139,53	87,96	60,00	1326,00

Table 6: Comparison of Groups I (≤ 7 days) and II (≥ 10 days) regarding the study of plasma triglyceride levels.

*: Variable parsed with log transformation.

Table 7 shows the variation in plasma uric acid levels in the two Groups (I and II).

GROUP	N Obs	Variable	N	Average	Standard deviation	Minimal	Maximum
≤ 7 days	179	AC_UR1	179	5,56	1,18	3,50	8,70
		AC_UR2	179	5,30	1,12	3,30	8,10
≥ 10 days	312	AC_UR1	312	5,52	1,35	2,60	9,50
		AC_UR2	312	5,07	1,28	2,30	8,30

Table 7: Comparison of Groups I (≤ 7 days) and II (≥ 10 days) regarding the study of the plasma level of uric acid.

*: Variable parsed with log transformation.

Through analysis of variance with repeated measures, we observed that the groups presented a difference in behavior (p<0.001).

The 7 ≤ day group decreased significantly (p<0.001) and the 10 ≥ day group also decreased (p<0.001). We observed through the averages that the group with ≤ 7 days decreases 4.68% and the group ≥ 10 days decreases 8.15%.

Table 8 presents the statistical study of the evolution of body weights presented by patients in group I (≤ 7 days) in successive admissions. We observed that there was a significant change in weight throughout the evaluations. There was a significant decrease between Entry 1 and Exit 1 (p<0.05). There was a significant increase between Exit 1 and Entry 2 (p<0.05) and there was a significant decrease between Entry 2 and Exit 2 (p<0.05). There was no significant difference between Entry 1 and Entry 2 or between Exit 1 and Exit 2.

Weight	N	Average	Standard deviation	Minimal	Maximum	Median	p*
Entry 1	121	79830,58	17287,90	51800	134000	76700,00	
Exit 1	121	76651,24	16201,68	50500	127400	74000,00	
							<0,001
Entry 2	121	78649,59	16279,83	50800	124400	76800,00	
Exit 2	121	75776,86	15295,13	48300	115700	74100,00	

Table 8: Body weight variation in successive interventions in Group I (≤ 7 days).

*: Descriptive level of probability of the non-parametric Friedman test.

Table 9 presents the incidence and evolution of Metabolic Syndrome found in the group with longer permanence under lifestyle intervention. Through McNemar's non-parametric test, we observed that this change from the moment before to the moment after is significant (p<0.001).

	Before	%	After	%	Total	%
Non-carriers	195	69,9%	30	10,7%	225	80,6%
Carriers	84	30,1%	54	19,3%		
Total	**279 (N)**					

Table 9: Metabolic Syndrome in Group II (≥ 10 days).

Metabolic syndrome (Group II):

Before treatment, 195 (69.9%) people did not have metabolic syndrome.

Eighty-four (30.1%) patients presented the syndrome at the beginning of treatment, of which 30 (10.7%) ended the treatment without the syndrome and 54 (19.3%) remained with it. Thus, at the end of the study, 80.6% of the patients did not have the syndrome.

Discussion:

All the parameters studied had statistical significance in terms of the evolutionary study (p<0.001), that is, from the initial moment to the end. They did not always present this relevance when comparing the results between the two Groups (I and II).

According to the statistical data demonstrated, the biochemical indices studied showed favorable changes in both series (Groups I and II).

Plasma glucose levels decreased significantly in both groups, although there was no important distinction between them (Table 1).

Plasma uric acid showed a similar behavior and presented a more favorable result in the second group, the one with the longest permanence (Table 7).

The indices that express the metabolism of lipids, namely total cholesterol, LDL-cholesterol and triglycerides, presented, however, in addition to a favorable and statistically significant evolution in the two groups evaluated, an important distinction in the results between them, with better results in Group II. In these indexes, the relative improvement from Group II to Group I was almost doubled: total cholesterol - 4.94% to 9.35%; LDL-cholesterol - 6.7% to 10.45%; and triglycerides - 9.02% to 17.35% (Tables 2, 4, 5 and 6).

HDL-cholesterol, although it showed a significant increase in both groups, did not show an important distinction between them (Table 3).

GROUP	N Obs	Variable	N	Average	Standard deviation	Minimal	Maximum
≤ 7 days	178	COL_HDL1	178	49,84	6,89	33,00	64,00
		COL_HDL2	178	51,69	8,86	34,00	131,00
≥ 10 days	312	COL_HDL1	312	50,41	7,88	29,00	84,00
		COL_HDL2	312	52,46	8,32	5,00	82,00

Table 3: Comparison of Groups I (≤ 7 days) and II (≥ 10 days) regarding the study of the plasma level of the HDL fraction of cholesterol.

*: Variable parsed with log transformation.

GROUP (I) ≤ 7 DAYS						
Variable	**N**	**Average**	**Standard deviation**	**Median**	**Minimal**	**Maximum**
LDL1	175	143,09029	37,48895	142,60000	60,40000	345,80000
LDL2	175	133,34514	36,13374	137,40000	60,40000	337,00000
GROUP (II) ≥ 10 DAYS						
Variable	**N**	**Average**	**Standard deviation**	**Median**	**Minimal**	**Maximum**
LDL1	300	144,12200	43,94265	143,50000	21,80000	274,40000
LDL2	300	126,46133	38,81837	125,30000	32,40000	229,40000

Table 4: Comparison of Groups I (≤ 7 days) and II (≥ 10 days) regarding the study of the plasma level of the LDL fraction of cholesterol.

The evolution of the weights of those patients who underwent the lifestyle intervention more than once in the interval of two years was studied. This observation was made only in the group of those who remained seven days in treatment (Group I). As the statistical study points out, there was no significant difference between the weights at the time of entry in the first intervention (Entry 1) and the weights at the time of the last intervention (Entry 2). However, it should be noted that there was a decrease in weights both at the exit of the first intervention (Exit 1) and at the second intervention (Exit 2), resulting in a lower mean weight than in the first intervention. It is also important to highlight that the individuals had not reached their initial weight when they returned, although they had gained their weight (Table 8).

As can be seen in Appendices 1 and 2, approximately 52% of the individuals who returned had improved their weight, based on the recording of weights at exit (Exit 1), while 48% had worsened. It is noteworthy that the magnitude of the new weight gain in this group (48%) was possibly responsible for the inexpressive result captured in the weight averages.

The presence of metabolic syndrome was also observed among the individuals in Group II, those who remained in treatment for a period of more than ten days (Table 9). There was a total of 84 patients with this condition initially, and after the treatment period, the dysmetabolism was maintained in only 54 (64% of the total number of patients), with improvement in the alteration in 30 individuals (36% of the total number of patients).

Conclusion:

According to the data presented, we can conclude that:

Patients who underwent acute lifestyle intervention, according to the method proposed and practiced by Lapinha Medical Spa, showed improvement in the metabolic parameters studied, especially those who remained in treatment for more than ten days. In these patients, total cholesterol levels were close to the optimal level, LDL cholesterol levels were in the desirable category, and triglycerides were within the optimal range. There was a desirable clinical-metabolic evolution, promoting individuals from the condition of having to not having Metabolic Syndrome. All these changes certainly reduced the risk of atherosclerotic phenomena and atherosclerotic arterial disease.

Short and repeated lifestyle interventions, according to the model described, were able to promote medium and long-term changes in 52% of the individuals submitted, taking body weight as a parameter.

Such modifications point to the model presented as a valid and efficient alternative in promoting better quality of health and a better lifestyle.

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Conflict of interest:

None.

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Appendices

Appendices 1 and 2 show the evolution of the weights of individuals who returned for more than one treatment in a two-year period, among those in Group 2.

Appendice 1. Weight improvement in the medium term.

Situation A. Comparison between the entry weight at the first coming and the entry weight at the last coming.

Situation A	Improved (%)	Worse (%)	Remained (%)
	53,72	43,80	2,48

Appendice 2

PERCENTAGE (IMPROVEMENT X WORSENING) IN RELATION TO THE WEIGHT OF ENTRY BETWEEN ARRIVALS			
Evolution 1			
Improved	53,72%	65	
Worse	43,80%	53	
Remained	2,48%	3	
Sum		121	
Improvement Profile (Evolution 1)			
0% - 2%	30,77%	20	65
2% - 4%	26,15%	17	45
4% - 6%	12,31%	8	28
6% - 8%	15,38%	10	20
8% - 10%	7,69%	5	10
> 10%	7,69%	5	5
Worsening Profile: (Evolution 1)			
0% - 2%	47,17%	25	53
2% - 4%	30,19%	16	28
4% - 6%	11,32%	6	12
6% - 8%	9,43%	5	6
8% - 10%	1,89%	1	1
> 10%	0,00%	0	0

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