

## **EFFECTS OF OSTEOPATHY ON HAEMOCHROME AND BLOOD PRESSURE**

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### **ABSTRACT**

The purpose of this study is to enrich the present literature through a pilot randomized controlled clinical trial that evaluates the effects of Osteopathic Manipulative Therapy (OMT) Protocol on human hemodynamic.

Randomized controlled clinical trial - a pilot study. For the study were enrolled 40 male volunteers, selected from a population of 97 subjects and randomized into two groups of 20 each. To the treated group was administered a protocol of osteopathic techniques of lymphatic pump, while the control group did not receive any treatment.

The study was divided into five stages where S0: supine rest for 35 minutes S1: blood pressure measurement and blood sampling, S2: administration of OMT for the treatment and rest in the supine position for the control group, S3: measurement blood pressure and supine rest for 35 minutes and S4: blood sampling.

All subjects well tolerated the lymphatic treatment without complaining of pain or any other disorder. Our data revealed no statistically significant result, the only population affected appeared to be that of monocytes (p-value = 0.0424) but a more careful assessment of the specific boards of the Wilcoxon test did not reveal a significant difference between the data before and after treatment).

However, it can be noticed that in terms of the analysis of arterial pressure both minimum and maximum, the subjects of the treated group show a p-value slightly higher than that considered significant (0.0988 for the study of systolic and 0.0712 for the study of diastolic blood pressure), a result which agrees with the literature.

**Key words:** osteopathic manipulative therapy, blood pressure, haemochrome.

## INTRODUCTION

For a long time Osteopathy has recognized the importance of the lymphatic system in maintaining and recovering health. Numerous scientists discussed its importance, from Andrew Taylor Still, who dedicated in his book "Philosophy of Osteopathy (1899)" an entire chapter to this theme (the importance of restoring the circulation of liquid in order to assure that "all is well watered"), to Miller<sup>1</sup> who developed the lymphatic pump technique in 1926, including Smitt<sup>2</sup> who had already reported that on the occasion of the 1917 flu pandemic, osteopathic manipulative treatment decreased the mortality rate significantly, and many more: Lane (1920)<sup>3</sup>, Mesina et al. (1998)<sup>4</sup>, Noll et al. (1999)<sup>5</sup>, (2000)<sup>6</sup> and (2008)<sup>7</sup>, Knott et al. (2005)<sup>8</sup>, who have contributed in various ways.

The revision of scientific studies provides a lot of useful information for understanding the mechanisms and the importance of the lymphatic circulation, as well as the explanations on osteopathic manipulative techniques that affect this system. These include experiments on animals<sup>3,9,10-22</sup> and human beings<sup>2,4-6-23-34</sup> in which is administered Osteopathic Manipulative Therapy (OMT) that includes one or more specific techniques for the lymphatic system. Among the most common lymphatic techniques are "the thoracic pump technique" and "the abdominal pump technique." Among the studies on human beings we were mostly interested in those of Dr. Rivers et al.<sup>27</sup> and of Dr. Noll et al.<sup>7</sup>, which we used as a starting point of our study. It should be considered the engine control capabilities cerebellum-dependent.

The objective was to evaluate the effects on haemochrome and on systemic arterial pressure after administration of a precise osteopathic lymphatic protocol, for both timing and techniques, using a randomized controlled study.

## MATERIALS AND METHODS

The study was conducted at the Italian Osteopathic Study Center of Catania, director A. Rapisarda; the Rehabilitation Center of Rosolini (Sr.), chairperson Dr. M. Minardo; Blood Donors Association in Siculiana (Ag), chairperson Dr. A. Marsala; The Physical Therapy Department of the Mediterranean Clinic in Ragusa, head Dr. Q. Celestri and The Blood Transfusion Center of the Hospital 'Vittorio Emanuele' in Gela, head Dr. A. M. Messina.

For the study were elected healthy voluntary male subjects between 20 and 40 years of age, female subjects were excluded because of the changes in the regulation of fluids due to the menstrual cycle<sup>27</sup>. Subjects engaged in a resistance training program were also excluded because of subsequent changes in the regulation of physiological fluids.

Inclusion criteria for participation in the study were: male sex; between 20 and 40 years of age; not smoking; without allergic disorders; autoimmune: respiratory system, gastrointestinal, osteoarticular or malignant tumor, tuberculosis and general infectious diseases (bacterial and viral), including tropical diseases, diabetes, convulsion, fainting, epileptic attack, febrile episodes or flu syndromes, cardiovascular diseases, jaundice and / or hepatitis, kidney and hematologic disease; not having suffered thoracic injuries in the last six months or thoracic fractures throughout life; not suffering from anxiety or depression, not taking medications for at least two months; fasting. (Table 1). 97 subjects were recruited, of which only 40 were enrolled. The remaining 57 were within the exclusion criteria because: 10 smoked, 8 had flue, 6 had allergies, 4 had traumas, 6 were taking medications, 10 had recent operations, 3 had tattoos and 10 practiced intensive training.

40 suitable subjects were randomly assigned into two groups, one was the study group which was subjected to a protocol of osteopathic lymphatic techniques and the other was the control group that did not receive any treatment. The decision not to administer any treatment to the control group instead of a simulated treatment arose from the difficulty of designing a fictitious protocol that is not very effective and at the same time credible<sup>35</sup>.

**Table 1.** Exclusion criteria

#### Exclusion criteria

- Subjects engaged in a resistance training program were excluded, as well as the female subjects, because of the subsequent physiological changes in the regulation of fluids;
- younger than 20 and older than 40 years of age;
- tobacco users;
- subjects with medical history of allergic disorders; autoimmune: respiratory system, gastrointestinal, osteoarticular or malignant tumor, tuberculosis and general infectious diseases (bacterial and viral), including tropical diseases, diabetes, convulsion, fainting, epileptic attack, febrile episodes or flu syndromes, cardiovascular diseases, jaundice and / or hepatitis, kidney and hematologic disease;
- recent thoracic injuries and thoracic fractures including the non recent ones;
- anxiety states or depression;
- current pharmacologic treatments (aspirin, analgesics, steroids, antibiotics, supplements, etc.) or in the last 2 months;
- splenectomy, recent surgery including dental care;
- not fasting.

All 40 subjects were given informed consent and reminded not to take food or liquids for 12 hours before the study. Upon arrival at the clinic (Stage 0), the subjects were asked to empty the bladder, to measure the unclothed body weight by digital bathroom scale, to drink 5 ml of water per kg and to lie down in the supine position, observing the absolute rest (for hemodynamic stabilization) and not to take food or liquids for the entire experimental period.

After a period of 35 minutes after taking the supine position<sup>36-38</sup> systolic and diastolic arterial pressure was measured and the first haematic blood sampling was carried out on all subjects (Stage 1). Watchfully we did blood draws (two cc) at the crook of the left elbow, repeating the subsequent draws from the same vein, using single-use syringe of 5 cc and reserving the other arm for the measurement of blood pressure. Immediately after (Stage 2) to the treated group was administered the Protocol of osteopathic lymphatic techniques which lasted approximately 10 minutes, Table 2 (Protocol of osteopathic lymphatic techniques), while the control group was simply at rest in the supine position.

**Table 2.** Protocol of osteopathic lymphatic techniques

## Protocol of osteopathic lymphatic techniques

- direct myofascial release for the thoracic inlet for 30 seconds;
- rib raising on Each Side of the body for 60 seconds;
- thoracic pumping for 60 seconds;
- doming of the abdominal diaphragm for 30 seconds;
- abdominal pumping for 60 seconds;
- pedal pumping for 60 seconds;
- to second thoracic pump for 60 seconds;
- direct myofascial release for the thoracic inlet for 30 seconds

After a minute from manipulative intervention administered to the treated group, systolic and diastolic blood pressure was measured in all 40 subjects (Stage 3) and after additional 35 minutes the 2nd haematic sample was taken from both groups (Stage 4).

The environments where the survey took place have been kept at a temperature between 22° and 23° degrees Celsius.

Individuals who were in the treated group well tolerated manipulative treatment without reporting pain or any discomfort in the room, moreover in order to be sure they were contacted by phone 24 hours after the treatment.

Haematic samples were analyzed at the BIOLAB laboratory Clinical Analysis and Laboratory Medicine of Syracuse by apparatus ABX Pentra 60, brand HORIBA.

## RESULTS

For each studied parameter first was examined the provenance of data from a normal population. Based on that, we chose to perform parametric test (Student-t) or non-parametric (the Wilcoxon test). In any case, we calculated the p-value in order to test whether there is a significant difference between the values before and after.

The results were placed into two tables:

Table 3 - Analysis of White Blood Cells and its components

Table 4 - Analysis of Red Blood Cells, Hematocrit, Hemoglobin, Platelet and Arterial Pressure

From analysis of the Table 3 data it can be noticed that none of the parameters studied, both for the control group and for the group subjected to the treatment, show significant difference (p-value <0.05) between the values observed before and after.

PARAMETER UNDER STUDY	PURPOSE OF THE STUDY GROUP	TEST FOR NORMALITY		CHOISE OF TEST	TEST T 19 G.D.L ALFA 5%		WILCOXON TEST	
					CRITICAL VALUE OF MORE SIGNIFICANT IF 2.093	P.VALUE IF SIGNIFICANT LESS THAN 0.05	N	TEST
WHITE BLOOD CELLS	CONTROL GROUP	REPORT SYMMETRY	-1.5365	T DI STUDENT	1.7399	0.0985	19	1.3481
	TREATY GROUP	REPORT KURTOSI	0.5172	WILCOXON TEST				
LYMPHOCYTES LYM	CONTROL GROUP	REPORT SYMMETRY	5.7763	WILCOXON TEST	18	1.4807	18	1.4807
		REPORT KURTOSI	8.6645	WILCOXON TEST				
	TREATY GROUP	REPORT SYMMETRY	-4.6761	WILCOXON TEST	16	-0.2844	16	-0.2844
		REPORT KURTOSI	6.4618	WILCOXON TEST				
MONOCYTES MON	CONTROL GROUP	REPORT SYMMETRY	-2.2762	T DI STUDENT	1.2980	0.2115	12	-2.0396
		REPORT KURTOSI	1.4313	WILCOXON TEST				
	TREATY GROUP	REPORT SYMMETRY	-5.3517	WILCOXON TEST	19	0.5231	16	-0.3878
		REPORT KURTOSI	-8.2464	WILCOXON TEST				
NEUTROPHILS NEU	CONTROL GROUP	REPORT SYMMETRY	-6.7257	WILCOXON TEST	16	-0.3878	17	0.071
		REPORT KURTOSI	11.776	WILCOXON TEST				
	TREATY GROUP	REPORT SYMMETRY	4.5066	WILCOXON TEST	17	0.071	17	0.071
		REPORT KURTOSI	4.8034	T DI STUDENT				
EOSINOPHILS EOS	CONTROL GROUP	REPORT SYMMETRY	3.04916	WILCOXON TEST	0.063	0.9503	17	0.071
		REPORT KURTOSI	3.3192	WILCOXON TEST				
	TREATY GROUP	REPORT SYMMETRY	-1.2583	T DI STUDENT	0.063	0.9503	17	0.071
		REPORT KURTOSI	2.5284	WILCOXON TEST				

**Table 3.** Analysis of white blood cells and its components

\*\* The only significant value seems to be that referred to monocytes for the treated group ( p-value = 0.0424 ), but it can be noticed that having used the Wilcoxon test, it was detected that the number of pairs of values that show some difference ( after removing zero differences ) is equal to 12, being the number of pairs less than 16 ( minimum amount of information that allows us to consider the distribution approximately normal), one must refer to the specific tables for the Wilcoxon test when the number of data is lower than 16.

For N = 12 and in a two-way test the critical value is T = 13, while the value detected from the analysis of data is T = 64.5 is greater. Therefore, we accept the hypothesis H0 that there is no significant difference between the data before and after treatment.

Thus we can state that the analyzed data, both for the control and for the treated group, do not indicate significant differences.

PARAMETER UNDER STUDY	PURPOSE OF THE STUDY GROUP	TEST FOR NORMALITY	CHOICE OF TEST	TEST T 19 G.D.L. ALFA5%		WILCOXON TEST		
				CRITICAL VALUE OF MORE SIGNIFICANT IF 2.093	P.VALUE IF SIGNIFICANT LESS THAN 0.05	N	TEST	P- VALUE
RED BLOOD CELLS RBC	CONTROL GROUP	REPORT SYMMETRY	-1.3450	T DI	2.02	0.061		
		REPORT KURTOSI	-0.5111	STUDENT				
TREATY GROUP	CONTROL GROUP	REPORT SYMMETRY	-4.1253	WILCOXON			16	-0.5946
		REPORT KURTOSI	6.3974	TEST				
HEMOGLOBIN HGB	CONTROL GROUP	REPORT SYMMETRY	-1.4812	T DI	0.1238	0.9025		
		REPORT KURTOSI	1.2855	STUDENT				
TREATY GROUP	CONTROL GROUP	REPORT SYMMETRY	-5.1646	WILCOXON			19	0.181
		REPORT KURTOSI	8.4323	TEST				
HEMATOCRIT HCT	CONTROL GROUP	REPORT SYMMETRY	0.4792	T DI	1.47	0.1645		
		REPORT KURTOSI	-0.4883	STUDENT				
TREATY GROUP	CONTROL GROUP	REPORT SYMMETRY	-4.069	WILCOXON			16	0.3361
		REPORT KURTOSI	6.1904	TEST				
PLATELETS PIT	CONTROL GROUP	REPORT SYMMETRY	-5.0486	WILCOXON			20	0.28
		REPORT KURTOSI	7.4267	TEST				
TREATY GROUP	CONTROL GROUP	REPORT SYMMETRY	2.5129	T DI	1.056	0.3048		
		REPORT KURTOSI	2.093	STUDENT				
BLOOD PRESSURE TOP	CONTROL GROUP	REPORT SYMMETRY	-1.6852	WILCOXON			19	1.7706
		REPORT KURTOSI	2.7578	TEST				
TREATY GROUP	CONTROL GROUP	REPORT SYMMETRY	-0.7378	T DI	1.7372	0.0988		
		REPORT KURTOSI	0.2154	STUDENT				

**Table 4.** Analysis of Red Blood Cells, Hematocrit, Hemoglobin, Platelet and Arterial Pressure

The analysis of Table 4 shows that even in this case there are no statistically significant differences at a level  $\alpha$ , however it can be seen that with regard to the analysis of both minimum and maximum arterial pressure, the group of treated subjects indicates a p-value slightly higher than that considered significant (0.0988 for the study of maximum arterial pressure and 0.0712 for the study of minimum arterial pressure).

## DISCUSSION

With this study we wanted to make a contribution to the osteopathic literature and in particular to the lymphatic techniques trying to stay as much as possible in the canons of science. This work was also influenced by the great problem of 'Evidence Based Osteopathic Medicine' that nowadays in Italy is in the foreground of the osteopathic field.

Using this type of methodology the problem of the "dependent operator" in the direct evaluation of the results was bypassed, as haemochrome and blood pressure are instrumentally measurable.

Our results did not reveal any statistically significant data, the only population affected appeared to be that of monocytes (p-value = 0.0424) but a more careful assessment of the specific boards of the Wilcoxon test did not reveal a significant difference between the data before and after treatment).

However, it can be noticed that in terms of the analysis of both systolic and diastolic arterial pressure, the subjects of the treated group show a p-value slightly higher than that considered significant (0.0988 for the study of systolic and 0.0712 for the study of diastolic blood pressure), a result which agrees with the literature<sup>27,39,40</sup>.

We cannot report about basophils<sup>4</sup> due to a technical problem that did not perform counts in some samples therefore we preferred to omit this information.

In order to be confronted with the literature<sup>15</sup> we have to indicate the choice of rest period and the number of blood samples of this work which was mainly influenced by the degree of tolerability of voluntary subject, that was less available for longer waiting periods and many punctures. The latter also greatly influenced the recruitment of subjects.

We believe the next step would be to compare these data with both healthy and pathology affected samples. In the first case the samples were taken immediately after the treatment in order to minimize the period of re-entry within the normal range while the affected sample was used to assess the purpose of increasing immune defences of lymphatic treatment of a body "in need"<sup>5-7,41</sup>.

The comparison between studies must be done with caution as treatment protocols vary from study to study. Moreover, it would be interesting to know the contribution of each technique in order to create a more effective protocol. However, such comparisons would be of great value<sup>35</sup>.

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