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## Evaluation of the effectiveness of microkinesitherapy in reducing intraocular pressure in patients with glaucoma

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## Ocena skuteczności zabiegów mikrokinetyterapii w obniżaniu ciśnienia śródgałkowego u pacjentów z jaskrą

### Streszczenie

Celem pracy była ocena wpływu zabiegów z mikrokinetyterapii mięśni gałki ocznej na wartość ciśnienia śródgałkowego u pacjentów z jaskrą. Badaniami została objęta grupa 32 pacjentów (21 kobiet i 11 mężczyzn) z poradni leczenia jaskry przy Specjalistycznym Szpitalu im. dr. Alfreda Sokołowskiego w Wałbrzychu. Badanych podzielono na dwie grupy: grupę eksperymentalną, która poddana była zabiegowi mikrokinetyterapii, oraz grupę kontrolną. W wszystkich badanych dokonano dwóch pomiarów ciśnienia śródgałkowego za pomocą metody AIR PUFF. Analiza danych nie wykazała istotnych statystycznie zmian w obu grupach. W grupie eksperymentalnej odnotowano obniżenie średnich wartości ciśnienia, w grupie kontrolnej natomiast podwyższenie średnich wartości ciśnienia śródgałkowego. Przedstawione wyniki pozwalają przypuszczać, że mikrokinetyterapia obniża ciśnienie śródgałkowe, ale nie można jednoznacznie potwierdzić, że jest to alternatywna metoda leczenia jaskry.

**Słowa kluczowe:** mikrokinetyterapia, jaskra, ciśnienie śródgałkowe

### Abstract

The purpose of the study was to assess the impact of microkinesitherapy treatment on intraocular pressure in patients with glaucoma. The study included a group of 32 patients (21 women and 11 men) from the Glaucoma Outpatient Clinic at Dr Alfred Sokołowski Specialist Hospital in Wałbrzych. Patients were divided into two groups: an experimental group that received microkinesitherapy, and a control (placebo) group. In all subjects, two measurements of intraocular pressure were made using the AIR PUFF method. The data analysis did not show statistically significant changes in both groups ( $p < 0.13$  vs.  $p < 0.08$ ). In the experimental group, a decrease in mean pressure values was observed, while in the control group, an increase in mean pressure values of intraocular pressure was observed. The results obtained in the present study show that the aforesaid novel therapeutic method has the potential to reduce intraocular pressure, but it cannot unambiguously be stated that it offers an alternative approach to treat glaucoma.

**Keywords:** microkinesitherapy, glaucoma, intraocular pressure.

### Introduction

Glaucoma is one of the main causes of irreversible blindness in developed countries [15]. Currently, there are seven million people in the world who have lost their sight due to glaucoma. Only every second patient with glaucoma is aware of their illness [11]. The term 'glaucoma' refers to group of eye diseases that can cause vision loss and blindness by damaging an optic nerve [12]. Elevated intraocular pressure is one of the main factors contributing to the development of neuropathy. In 90% of cases, glaucoma is latent and painless, with no noticeable deterioration of the visual field, but it progresses constantly and irreversibly damages the optic nerve [16]. Currently, there are three approaches

described as standard procedures in the treatment of glaucoma and aimed at reducing intraocular pressure [17]. One involves pharmacological treatment which involves the use of eye drops and whose mechanism of action is associated with the reduction of intraocular pressure or slowing down or reducing the production of the aqueous humor in the eye [15]. Another approach involves the use of the laser method, in other words, trabeculoplasty, applying a procedure of opening closed pores, which allows the drainage of the aqueous humor, thus reducing the pressure inside the eyeball [16]. Surgical treatment is the last resort, and it is used when other methods do not offer the desired effect and do not sufficiently lower the pressure inside the eye [10]. The extraocular apparatus is formed by three pairs of muscles, whose work determines the movements around the point that lies along the optical axis [7]. The first pair of muscles includes the medial and lateral rectus muscles. The second pair consists of the superior and inferior rectus muscles. The third pair is formed by the inferior oblique and superior oblique muscles. All these muscles have their origin in a common tendinous ring and end with the sclera. Their normalized tension provides the free flow of the aqueous humor and normalized intraocular pressure [8]. The microkinesitherapy technique was developed in France [13]. It represents a therapeutic approach referred to as informational medicine. The fundamental premise assumes that the therapist is not the one who triggers the action on the patient, but only initiates self-repair processes. It is commonly accepted by the scientific community that the body is capable of repairing itself and restoring its functions after any type of aggression or disturbance. The purpose of the study was to assess the impact of microkinesitherapy treatment on intraocular pressure in patients with glaucoma.

## Methods

### Participants

The study group consisted of 32 subjects (21 women and 11 men), patients of the glaucoma clinic of Dr Alfred Sokołowski Specialist Hospital in Wałbrzych, Poland. The average age in the experimental group was  $66.5 \pm 9.9$  years, while in the control group it was  $70.7 \pm 10.2$  years. The patients were qualified for the study on the basis of the measurement using the non-contact AIR PUFF method of the intraocular pressure that equalled 17 mmHg and was higher the day following the initial test. The inclusion criteria included individuals aged 40 to 80 with intraocular pressure  $>17$  mmHg. The exclusion criteria included lack of consent to participate, less than six months after thoracic or cardiac surgery, and cognitive disorders. The study protocol included an initial measurement for all

participants. The patients were further randomly assigned to either the experimental group or the control group. Randomization was performed using the Research Randomizer (ratio 1:1), a web-based service that offers instant random assignment. In the experimental group, the microkinesitherapy treatment was performed, while in the control group, manual therapy was applied on the eyeball and the greater wing of the sphenoid bone. After the “treatment procedures” intraocular pressure was measured again using the same method and the same apparatus.

### **Measurement procedure**

The AIR PUFF test with the TOMEY Corp FT-1000 device was performed on the patient in a sitting position and under the supervision of qualified personnel of the ophthalmology ward. Pressure was measured before and after the microkinesitherapy treatment.

### **Treatment**

Microkinesitherapy forms a treatment technique of French origin developed by two physiotherapists, Daniel Grosjean and Patric Benini. This name comes from the combination of words micro – small, kinesis – movement, and therapy, which literally translates into treatment by small movement. The key element of the method is micropalpatation. It is a very delicate form of palpation examination that allows one to determine the condition of the tissues of the examined organism. Microkinesitherapy has its roots in embryology. The study of this method focused on a three-week embryo which consists of three germ layers, i.e. the ectoderm, mesoderm and endoderm, and the extraembryonic tissue. All of the body’s tissues are formed from them. Nerve tissues and epidermis, among others, develop from the ectoderm. The mesoderm produces muscle tissue, bone tissue and skin, and the endodermal mucous tissue develops into membranes of internal organs [2]. According to the principles of microkinesitherapy, intraocular muscles belong to the axial mesoblast and form the axial muscles with an origin in the CR 1, CR 2, CR 3 – bones of the skull, inferior oblique and superior oblique muscles, medial and lateral rectus muscles, as well as superior and inferior rectus muscles. On the basis of microkinesitherapy, damaged muscles manifest under the therapist’s fingers through loss of elasticity. The type of damage depends on the underlying etiology. For instance, a very slight stretching sensation indicates a traumatic origin, while myofascial closures indicate if the origin is neural. To treat the issue, the restoration of the traumatic (separately) or neural (together) etiology must be carried out as gently as possible, so as not to intensify the pain. Therefore, the therapist triggers the correction by directing rather than performing it, feeling how far the tissues are stretched, not

forcing beyond that limit, and waiting for the corrective response, which appears after a few seconds. A broader description of the method was presented earlier [8].

Microkinesitherapy treatments were performed once, lasted about 2 minutes, with the patient resting in the supine position, on a comfortable, medical couch. The therapist who stands by the patient uses one hand to gently press the larger wing of the sphenoid bone on the side of the eye with elevated pressure (according to the assumptions of microkinesitherapy, it is the attachment point of the intraocular muscles) and the other hand is used to seek for micro-strains on the eyeball (on the same side) with the patient's eyelid closed (Figure 1). The microkinesitherapy technique was performed on the muscles of both eyeballs. The placebo treatments were also performed in the supine position that was comfortable for the patient, on the medical couch. The therapist who stands by the patient, uses one hand to gently press the greater wing of the sphenoid bone and the other hand on the eyeball (on the same side) with the eyelid closed, improvising the microkinesitherapy procedure. The placebo technique was performed on the muscles of both eyeballs.



**Figure 1.** Correction of the eye muscles

Source: Grosjean, Benini, December 2009, *Therapeutic manual on microkinesitherapy*, Polish edition 2009.

## Data analysis

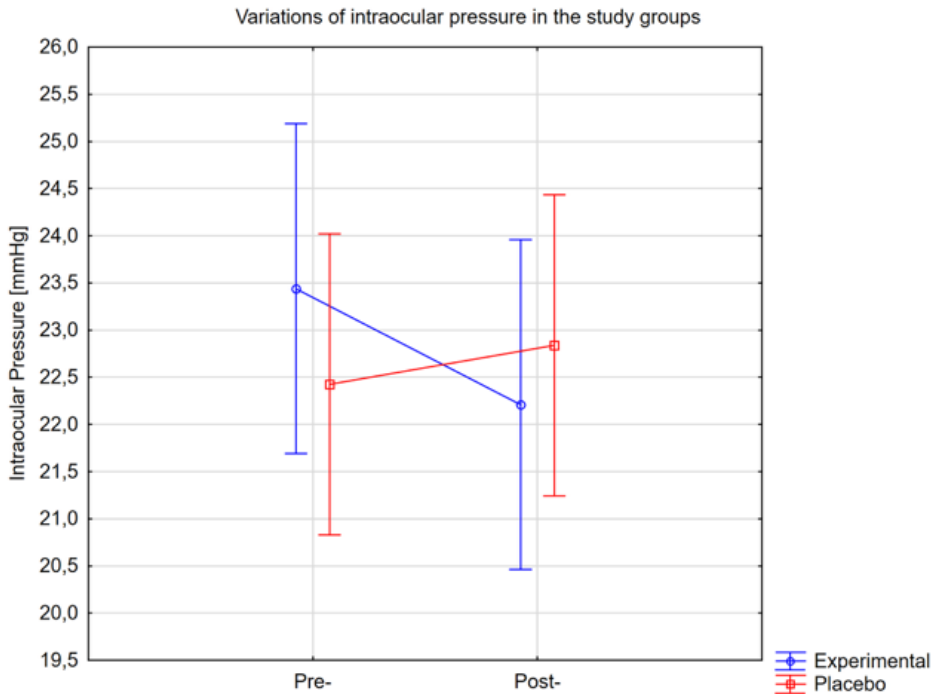
The results of the study were compiled in the form of an Excel spreadsheet and then subjected to statistical analysis using the Statistica 13.0 software (StatSoft, Palo Alto, CA, USA). Basic descriptive characteristics included the median with upper and lower quartiles. Variable analysis was performed, and after testing the normality of sample size distribution with the Shapiro-Wilk test, non-parametric tests were used. The nonparametric Wilcoxon test for within-group analysis and the Mann–Whitney U test for between-group analysis were used. Statistical significance of the results was accepted at  $\alpha < 0.05$ .

## Results

In the experimental group, the median initial pressure value was 23.3 mmHg. In this group, only one procedure was performed to lower intraocular pressure. The median pressure value after the microkinesiotherapy procedure was 21.85 mmHg. The difference in values was not statistically significant; however, a negative trend was observed (Table 1). In the control group, the median pressure value at the baseline was 22.1 mmHg, while the median value after the control attempt was 22.45 mmHg. The difference in value was not statistically significant (Table 1). The intergroup analysis of the pressure values after the treatments did not show any significant statistical differences between the studied groups ( $p < 0.59$ ) (Figure 2).

**Table 1.** Variations in intraocular pressure in the study groups. Results are presented as mean (SD) and median [IQR]

Group	Pre-intervention	Post-intervention	$\Delta$ Post-Pre	p-value
Experimental	23.5 (3.5) 23.3 [20.40–25.55]	22.4 (4.4) 21.85 [19.35–24.55]	-1.1 -1.45	0.13
Control	22.4 (3.6) 22.10 [20.35–24.60]	22.8 (3.8) 22.45 [20.35–25.95]	0.4 0.35	0.08



**Figure 2.** Variations in intraocular pressure in the examined subjects

## Discussion

Glaucoma is an eye disease for which the therapeutic procedure commonly recommends pharmacological treatment [9]. However, this type of treatment does not prove effective in all cases. In order to avoid more radical methods of its treatment (i.e. using laser or surgery), alternative methods with the potential to deal with glaucoma are still being examined. The results of this study do not indicate the effectiveness of microkinesitherapy treatment. However, they point to a non-significant reduction in intraocular pressure for the experimental group, which was not experienced by the patients in the control group. Therefore, the results of this study should be considered as an initial report, suggesting that the microkinesitherapy technique has the potential to lower intraocular pressure in patients with glaucoma. It has been indicated, however, that microkinesitherapy is effective for lowering blood pressure in patients with fibromyalgia [14]. The efficacy of microkinesitherapy has not been widely reported in clinical trials to date, yet one can consult the evidence that evaluates the effects of microkinesitherapy in the treatment of irritable bowel syndrome (IBS), where all patients reported pain reduction after treatments [5]. The beneficial effect of

microkinesitherapy on the reduction of lower back pain has also been demonstrated [6]. Improvements in functional abilities have also been reported in children with intellectual disabilities with respect to their behavioral and temperamental orientation, and neurocognitive orientation, following the application of the microkinesitherapy technique [3]. An attempt was also made to evaluate the effect of microkinesitherapy sessions on pain and flexion-extension amplitudes in posttraumatic acute neck pain. A significant reduction in pain intensity on a visual analogue scale was found in the microkinesitherapy group, whereas no reduction in pain intensity was found in the control group. The results indicate that an early session of microkinesitherapy is effective for pain alleviation and flexion-extension recovery in the treatment group [1].

### Limitations

Throughout the investigation, several problems were encountered that do not offer a clear statement regarding the effectiveness of the proposed method. The first of them was that the entire group of patients was under constant care of “Glaucoma service” at Dr Alfred Sokołowski Specialist Hospital in Wałbrzych (Poland) and was under the supervision of qualified professionals. The standard pharmacological treatment was being implemented in the group, which could affect the results of the present investigation. Furthermore, the research did not apply to any subjects who reported increased pressure and who did not begin any pharmacological treatment. If the tests comprised patients from such a group, the results would be more comprehensive. It seems important to replicate the study on a larger sample of subjects. Another problem was associated with the method applied to examine intraocular pressure. The air-puff method was used. This is a preliminary screening test that is not very accurate, giving only a preliminary picture of intraocular pressure. In these cases, intraocular pressure measurement with *Goldmann applanation* is recommended, as it is currently the most effective approach [4].

### Conclusions

The results obtained in the present study show that the novel therapeutic method has the potential to reduce intraocular pressure, but it cannot be unambiguously stated that it offers an alternative approach to treat glaucoma. This study offers a further step in the evaluation of the effectiveness of microkinesitherapy treatments in a wide spectrum of medical disciplines.



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### DECLARATION OF CONFLICTING INTERESTS

The authors declared no potential conflicts of interests with respect to the research, authorship, and/or publication of the article *Evaluation of the effectiveness of microkinesitherapy in reducing intraocular pressure in patients with glaucoma*.

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