INFLUENCING LUNG FUNCTION BY OSTEOPATHY IN IDIOPATHIC PARKINSON'S SYNDROME

Master Thesis to obtain the degree Master of Science in Osteopathy at the **Donau Universität Krems** deposited at the **Wiener Schule für Osteopathie** by

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Translation: Helga Klinger-Groier

STATUTORY DECLARATION

I, Gudrun Rupp, hereby declare to have written this present master thesis entirely by myself.

All passages used verbatim or paraphrased from other published or unpublished work have been marked as such. All sources and resources which I have used for this work have been specified. This work and its content have never been presented to an other examination authority.

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Date Signature

Acknowledgement

I would like to extend my special thanks to the subjects who took part in this study as well as to Prim. Prof. Dr. F. Reisecker (Head of the Neurological Department at the Brothers of Mercy Hospital in Graz Eggenberg) who allowed me to carry out this study in the hospital mentioned.
Furthermore, I would like to thank my colleagues and my life partner for their positive support during this study.

Abstract

The present study deals with the question whether lung function in Idiopathic Parkinson's Syndrome (IPS) can be influenced by osteopathy. This is a clinical outcome study, i.e. there is a control group (13 subjects) who received an up-to-date medical and physiotherapeutical treatment and a treatment group (13 subjects) who, additionally, received two individually adjusted osteopathic treatments within the intervention period. The average observation period was 16.5 days.

Lung function of Parkinson's patients in both groups was measured by means of spirometry (SpiroPro® by Jaeger) at the beginning and the end of the intervention period. Seven parameters (VCIN, FVC, FEV1, PEF, MEF25, MEF50 and MEF75) were measured to determine lung function.

For statistical processing mean values ± SEM were calculated. With the aid of the t-test data were checked for possible significances at $p<0.05$. Connections between two variables were verified by using linear regression analysis.

In the treatment group all 7 lung function parameters could be clearly improved. The changes in parameters FVC, FEV1, PEF, and MEF75 at $p<0.05$ were significant. Results of the control group did not show any significant differences. 5 out of 7 parameters even showed a deterioration within the observation period.

This study shows that osteopathy exerts influence on the lung function of Parkinson's patients.

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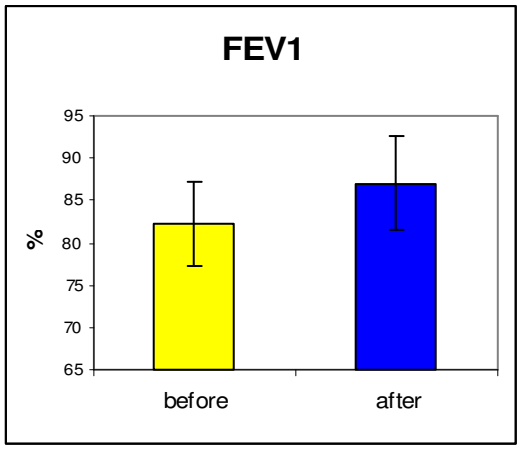
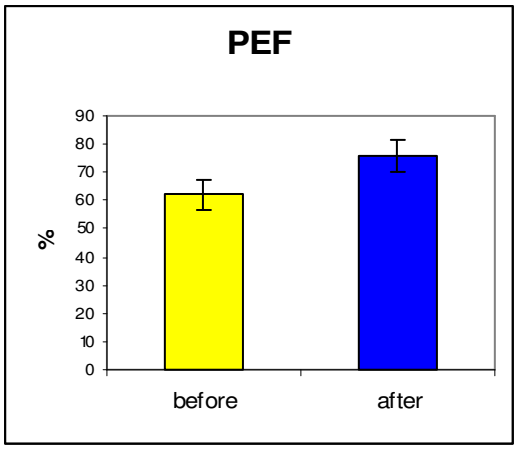


Diagram 4: FEV1 (MV) before/after



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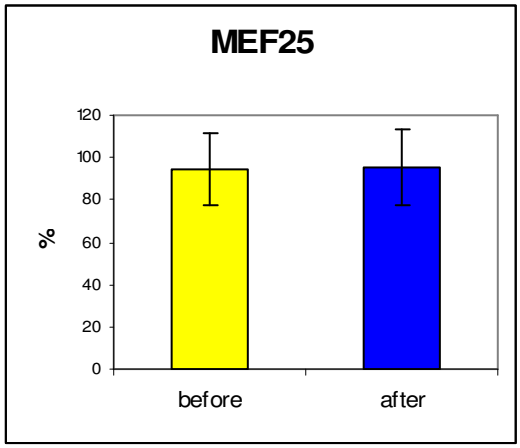

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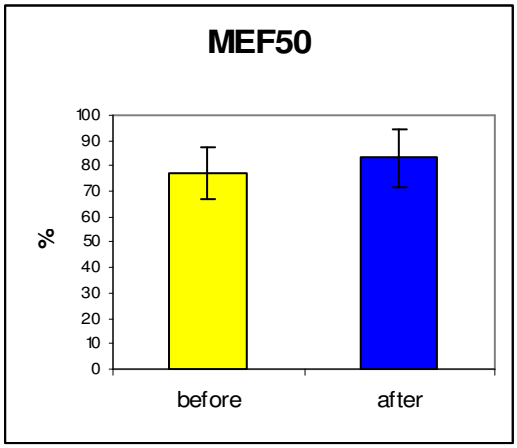

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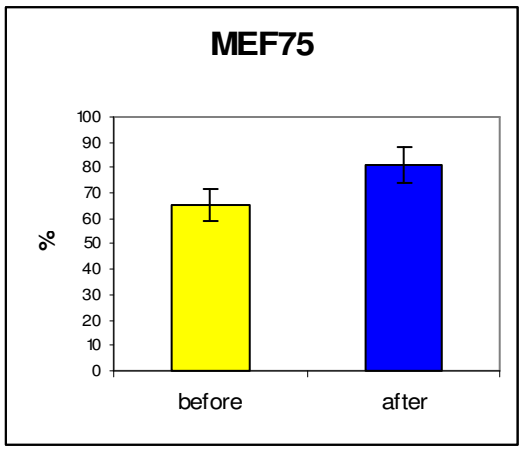


Diagram 8: MEF75 (MV) before/after

Diagrams 2-8: Illustration of individual MV ±SEM of all parameters before/after treatment

In the treatment group changes in parameter results of FVC, FEV1, PEF and MEF75 have been **significant** at $p<0.05$ (red in the table).

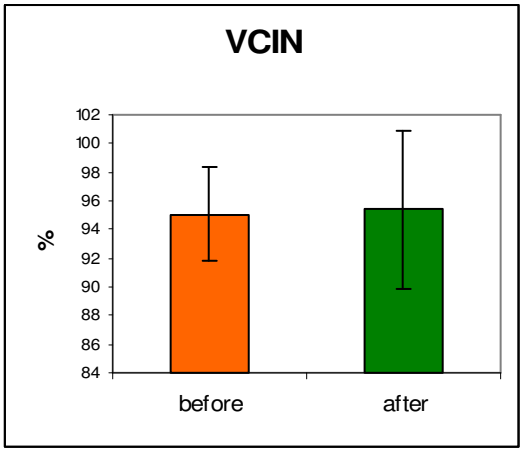
6.3 Comparison of Mean Values of all Parameters in the Control Group

The following table shows the mean values of individual parameters during the first and the last lung function test ± SEM as well as the t-test results.

- before first Parkinson's gymnastics
- after the last Parkinson's gymnastics

	MV before	SEM	MV after	SEM	T-Test
VCIN(%)	95,0769	±3,2841	95,385	±5,4631	0,943
FVC(%)	99,3076	±4,4013	106	±10,772	0,4419
FEV1(%)	104,077	±4,4319	102	±5,9693	0,4128
PEF(%)	85,9231	±3,85	84,462	±5,174	0,6589
MEF25(%)	107	±14,846	81,923	±10,965	0,0832
MEF50(%)	109,54	±8,909	96,08	±10	0,0736
MEF75(%)	94,308	±4,851	87,54	±4,541	0,111

Table 2: Comparison of mean values – control group



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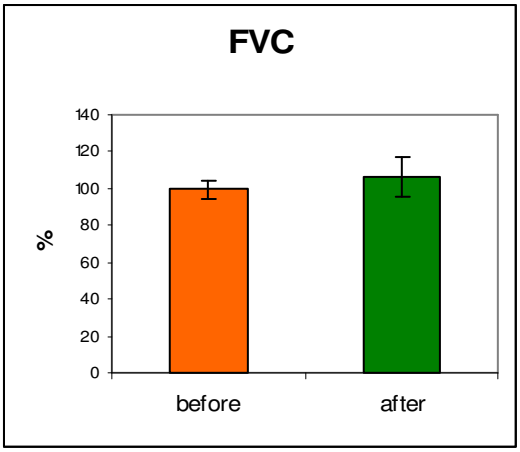
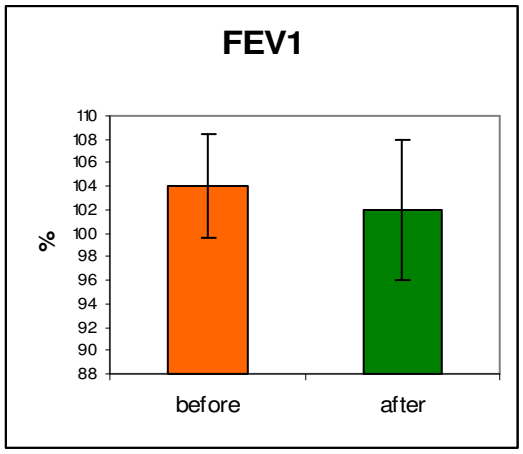


Diagram 10: FVC (MV) before/after



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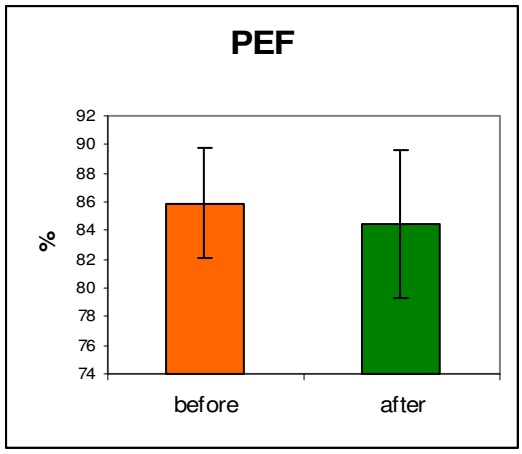

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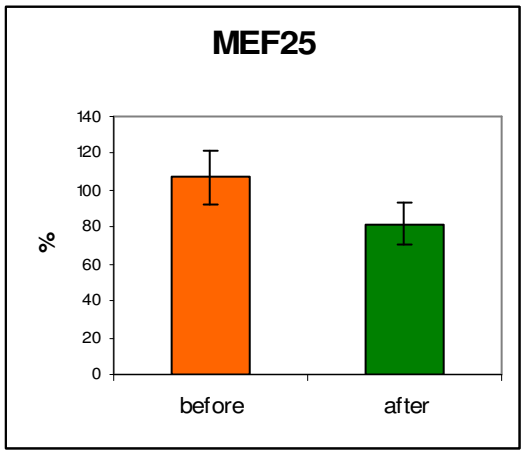

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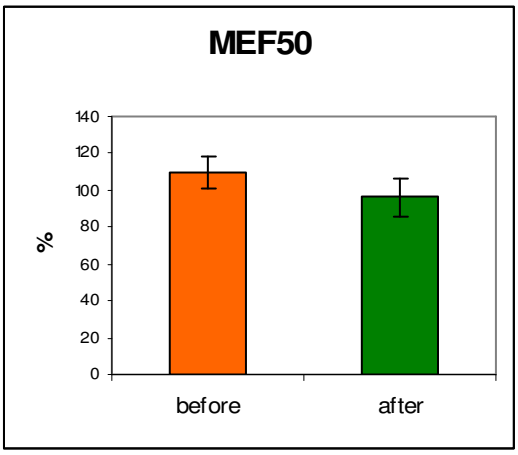

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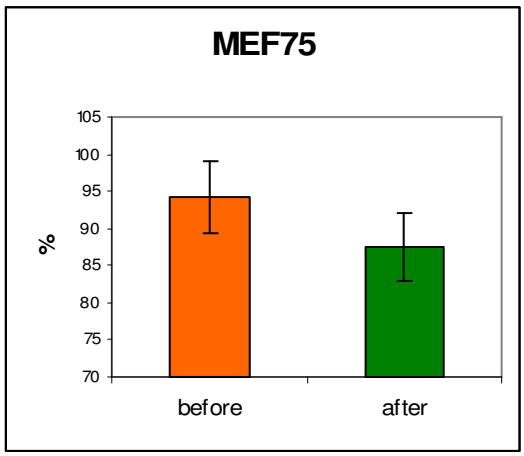


Diagram 15: MEF75 (MV) before/after

Diagrams 9-15: Illustration of individual MV ±SEM of all parameters before/after first/last Parkinson's gymnastics

The results of the control group showed **no significant differences.**

6.4 Comparison of Results between Treatment and Control Group

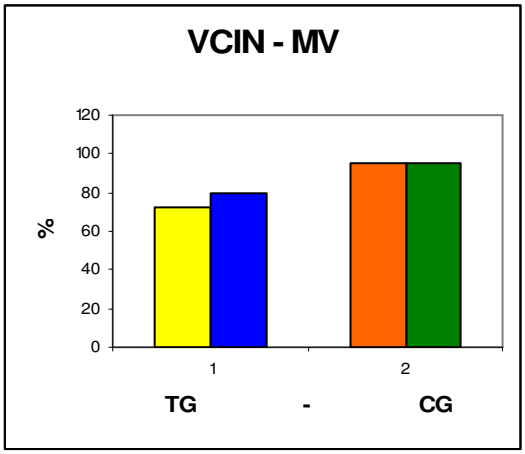
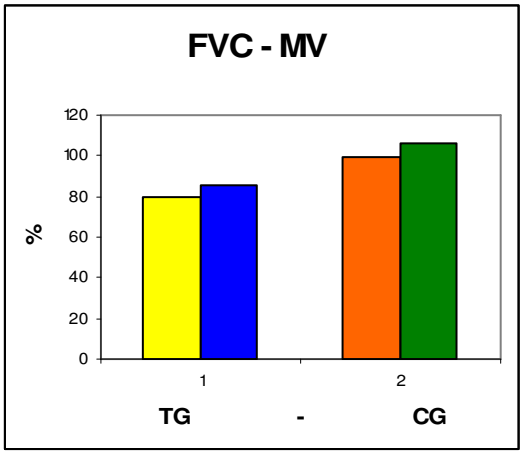


Diagram 16: VCIN (MV) TG and CG



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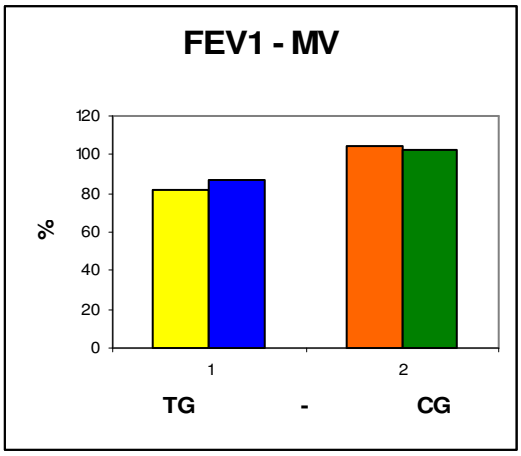

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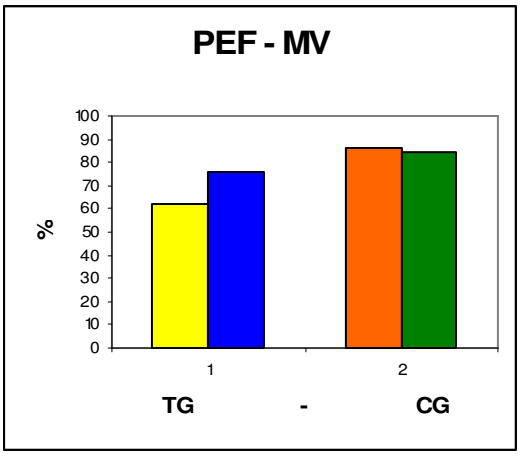

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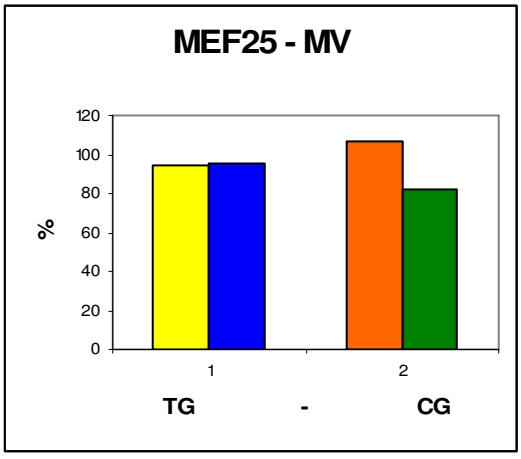

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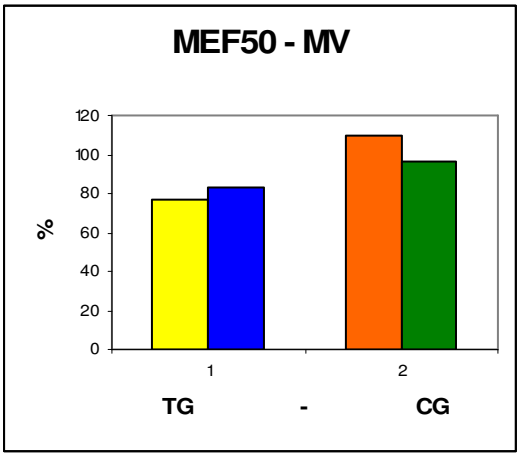

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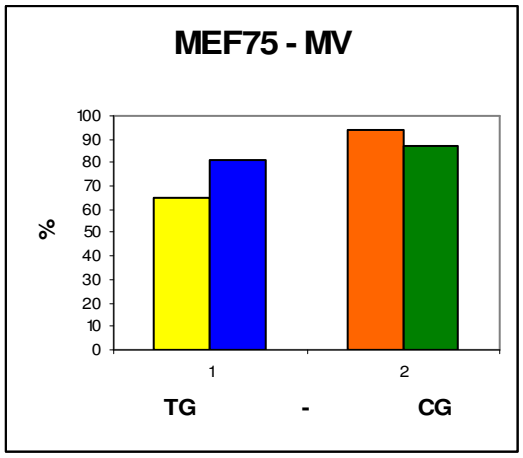


Diagram 22: MEF75 (MV) TG and CG

Diagrams 16-22: Comparison of results between treatment and control group

The direct comparison of both groups clearly shows that in the treatment group **all** parameters have changed positively, whereas in the control group 5 out of 7 parameters have even deteriorated.
Furthermore, the diagrams show that initial values in TG were worse than in CG. This indicates the significance of final results.

6.5 Further Results

During analysis of data material a correlation between length of the disease, hospital stay as well as the subject's age and the corresponding parameters have been considered. However, there were no significances, so I will abstain from depicting diagrams.

When comparing the changes before and after intervention phase with the subjects' ages however, I have made an interesting observation.
As can be seen in previous diagrams, changes tend to be more positive in the treatment group than in the control group where even a worsening during the observation period has been noticed. As an example four parameters will be depicted here. Interestingly, the extent of change increases with age.

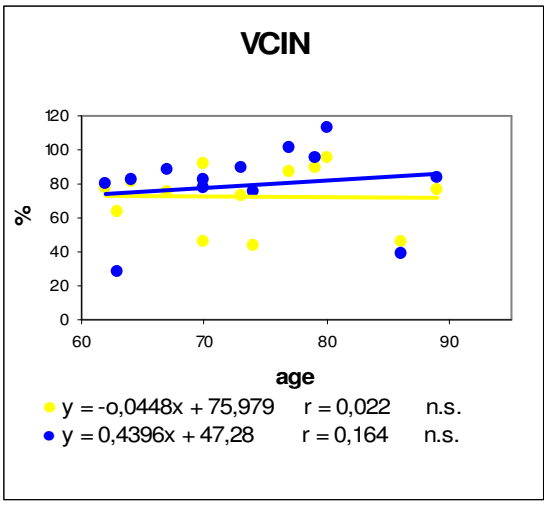
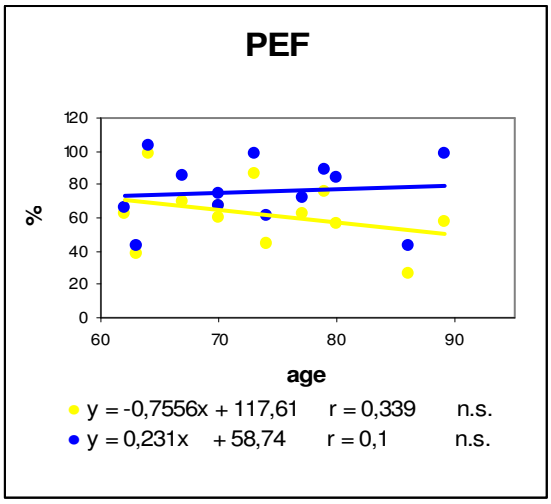


Diagram 23: Correlation age / VCIN (TG)



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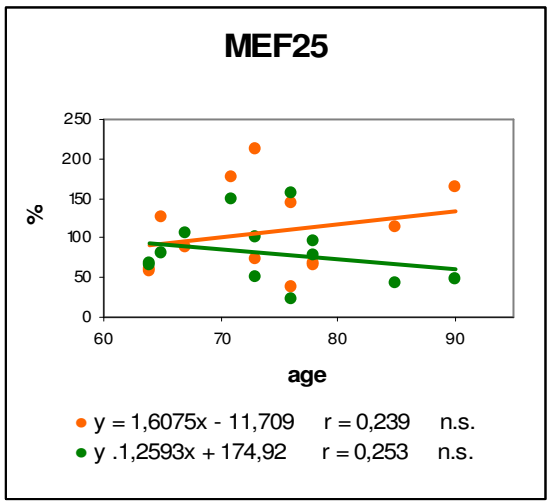

Diagram 25: Correlation age / MEF25 (CG)

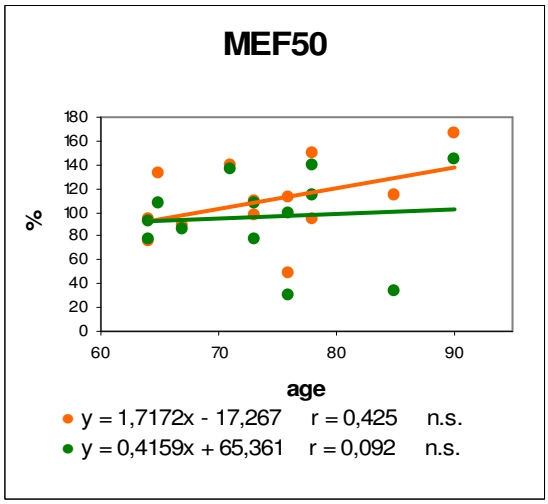

Diagram 26: Correlation age / MEF50 (CG)

Diagrams 23-26: Correlation between subjects' age and various parameters (before and after observation period, respectively)

As for the remaining parameters, similar tendencies have been observed, however, in parts the results have been different.

7 Discussion

7.1 Interpretation of Changes in % between TG and CG after Intervention Phase

A first impression of the results of this study can be obtained by diagram 1. In all parameters the changes in % show a positive tendency in favor of the treatment group. The exact changes in percent and the differences between the two groups are briefly depicted below.

% Change

VCIN	11,56%	MEF25	23,89%
FVC	2,48%	MEF50	22,51%
FEV1	8,14%	MEF75	35,90%
PEF	22,23%		

This permits the conclusion that **in this study and with these subjects osteopathy influences the lung function of Parkinson's patients.**

I am emphazising „in this study" and „with these subjects" because I am aware of the fact that the number of study participants is low and the length of the intervention very short.

7.2 Interpretation of Mean Values of all Parameters in the Treatment Group

The positive changes after osteopathic treatment are reflected in all 7 lung function parameters. The changes in parameters FVC, FEV1, PEF, and MEF75 at $p<0.05$ can be described as significant.

VCIN could be increased by 11.83%, FVC by 7.85%, FEV1 by 6.01%, PEF by 20.44%, MEF25 by 8.52%, MEF50 by 10.3%, and MEF75 by 28.42%.

The mean value of each parameter of the 13 study participants has been used.

Patients in an early stage of the disease showed abnormal lung function values.

In a study *Sabate et al* (1996) described lung function disorders in early stages of the disease. The expiratory vital capacity (FVC) and the expiratory one-second capacity (FEV1) were clearly below the norm in their study. Moreover, the patients showed deviations in peak flow (PEF) and midexpiratory flow at 50 and 75%, respectively (MEF50 and MEF75).
Canning et al (1997) examined lung function in patients with early-stage Parkinson's Disease and also found abnormal lung function values. Subsequent breathing and stamina training proved to lead to a partial improvement of lung function values.

My thoughts and considerations which I have described in Chapter 4 – Osteopathic Considerations – are confirmed by diagrams 2-8. As expected at the beginning of my study, certain structures (see chapter 4) almost lend themselves to be treated.
Parkinson's Disease is a complex neurological disease accompanied by numerous accessory symptoms. Therefore I regarded it as mandatory to carry out an individual custom-tailored osteopathic treatment. Of course, it would be interesting to concentrate on only one or a few techniques such as relieving the sphenobasilar synchondrosis (SBS).
According to *Magoun* (1976) the SBS plays an important role in the vascular supply of the brain. Dysfunctions in the sphenoid bone, particularly torsions and sidebending rotations, may lead to irritations of the medium cerebral artery and the cerebrospinal fluid in the subarachnoid space.
In their study *Rivera-Martinez et al* (2002) observed cranial lesion patterns in 30 Parkinson's patients. It turned out that there were frequent atlanto-occipital and occipito-mastoidal compressions (on both sides).

Another reason for the positive results might be that the patients treated with osteopathy received more attention. So the psychological factor was not the same in both groups.

7.3 Interpretation of Mean Values of all Parameters in the Control Group

As can be seen in table 2 and diagrams 9-15, respectively, the control group's results do not show any significances. Two parameters (VCIN and FVC) show a slight improvement, whereas 5 parameters (FEV1, PEF, MEF25, MEF50, and MEF75) deteriorated.

This result is surprising to me because I did not expect such deteriorations.
One possible reason for this development is the lack of attention for the probands as opposed to those in the treatment group.
Another explanation of this negative tendency is inactivity of the subjects during their hospital stays.

7.4 Interpretation of the Comparison of Results between Treatment and Control Group

In diagrams 16-22 can be seen that in the treatment group all parameters show an improvement, whereas in the control group 5 out of 7 parameters have even deteriorated.
Moreover, this direct comparison clearly shows that the initial values of the treatment group have been worse than those of the control group. This indicates the significance of the final result.

The subjects were randomly allocated to one of the two groups. This was done prior the first lung function measurements, so the different initial values in both groups are to be considered as accidental. In case of a higher number of subjects the initial values could have been different, of course.
Both during treatment and lung function measurement attention was paid to the fact that treatments took place always in the same room and at the same time. Possible fluctuations in Parkinson's symptoms were counteracted this way.

All subjects were explained the study's content and the meaning of lung function measurements.

During my anamnesis only a few patients subjectively mentioned breathing problems. In their study *Canning et al* (1997) describe that even in an early stage of the disease significant deficits in lung function are possible. However, patients hardly report any complaints and, in most cases, show normal results with regard to their functional capacity.

Lung function measurement depends on the cooperation of the subjects. So, during these measurements always the same instructions were given, i.e. the breathing maneuver was always accompanied by the same words.
Lung function can be precisely measured by means of body phlethysmography, however, this is a very cost-intensive method. The advantage of body phlethysmography is that the resistance which is significant with regard to obstruction could be measured.

In general, i.e. this applies to both groups, Parkinson's patients are rather immobile during their stay in hospital. With the exception of a few activities (daily Parkinson's gymnastics and short walks) the patients sit or lie down most of the time. Of course, this has a negative impact on respiration. From my own experience and from what Parkinson's patients and their relatives tell I know that Parkinson's patients are much more active at home.

The intake of various Parkinson's medications and other medications is the main element of uncertainty in this study. It was impossible to form a "uniform" patient group with regard to medication because all subjects suffer from different accessory symptoms and problems. I am aware of the fact that various medications and their combinations might influence respiration and thus possibly distort results. All of the 26 subjects had different combinations of medication.
Additionally, all subjects were treated with antidepressants. *Klein et al* (2004) emphasize that there are different opinions with regard to the question whether depresssion in Parkinson's Disease is a psychological reaction to the various losses and handicaps caused by the diseases or a direct manifestation of the disease itself due to ist neuropathology.

Other questions also remain unsolved. For example, if there were any factors that favored or deteriorated the outcome (I am thinking of the psychological situation, sleeping behavior, etc.)

Originally, 15 subjects per group were supposed to take part in the study, however, for various reasons (earlier release from hospital, deterioration of the patient's general condition, lack of compliance, etc.) this number was reduced to 13. With a larger number of participants tendencies in results might have been clearer.

This study only proves that osteopathy exerts influence on the lung function of Parkinson's patients, however, it does not reveal anything about a lasting effect of osteopathy. Thus, it would have made sense to repeat lung function measurements after a few weeks to show any tendencies in this respect. Unfortunately, for organizational reasons this was impossible as the study participants after their release from hospital were no longer available for me.

Subjects from the treatment group appeared somewhat „brightened" after treatment. Furthermore, I noticed positive changes with regard to other accessory symptoms of Parkinson's Disease, as, for example, an improvement of blood pressure fluctuations and positive changes with regard to obstipation.
Moreover, I noticed an improved body posture in the treatment group as well as a change in gait patterns.
In their study *Wells et al* (1999) analyzed the effect of a one-time, 30-minute osteopathic treatment in 10 Parkinson's patients. Another 8 Parkinson's patients served as control group. A separate group of 10 Parkinson's patients was given a sham-control procedure. This study dealt with the gait of Parkinson's patients. Step length, rhythm, shoulder movements, speed of arm movement, and the speed of movement of the lower extremity's large joints were measured by means of a two-dimensional gait analyzing system. Osteopathic treatment was performed according to a treatment scheme including 14 different techniques. Various gait parameters improved in the treatment group.
In her diploma thesis *Pelzl* (2004) also described an improvement in step length and walking speed in Parkinson's patients by 10%. After osteopathic intervention pronation and supination movement of the forearm improved by 5%.

7.5 Interpretation of Further Results

I made an interesting observation during the evaluation of the study results. Although no significant values can be shown there is a tendency that lung function in "older" Parkinson's patients could be better influenced than in "younger" patients. A possible explanation is that the organism tries to concentrate its existing potential on the improvement of vital functions such as breathing that are indispensable for life. Possibly

“older” people better react to external support to acitvate their self-healing powers than “younger“ persons.

In their study *Noll et al* (2000) also deal with older patients (60 years and up). In 28 patients who had been diagnosed with lung inflammation, 7 osteopathic techniques were applied. The control group consisted of 30 patients. These 30 patients were „treated“ with slight touches. Both groups were treated with antibiotics. The result of the osteopathic intervention (twice daily) was an earlier termination of antibiotic treatment and a significant reduction of the length of hospital stay.

Based on my observations osteopathy can contribute considerably to an improvement for people suffering from Parkinson’s Diesease. In Idiopathic Parkinson’s Syndrome lung function can be influenced by osteopathy. The improvement of this vital function is accompanied by a number of other positive changes. Maybe this study inspires my colleagues to further research on IPD and its accessory symptoms.

8 Summary

Idiopathic Parkinson's Syndrome is one of the most frequent neurological diseases. I am working in a neurological hospital which enables me to closely observe Parkinson's patients. I have frequently noticed that accessory symptoms in IPS, such as fluctuations in blood pressure or obstipation were considered in the medical treatment of Parkinson's patients, however, possible breathing disorders were hardly ever mentioned. This is why I wanted to take a closer look at the lung function of Parkinson's patients and examine whether an additional osteopathic treatment could improve lung function.

The clinical part of this thesis deals with the fundamentals of Parkinson's Disease and thoracic breathing. In addition to that the reader is given insight into osteopathic considerations.

This is a clinical outcome study, i.e. there is a control group receiving the usual medical and physiotherapeutic treatment and a treatment group receiving two additional osteopathic treatments within intervention period.

Lung funciton of study participants was measured by means of spirometry (SpiroPro® by Jaeger). The positive changes after osteopathic treatment are reflected in all 7 lung function parameters. The changes in FVC, FEV1, PEF, and MEF75 at $p<0.05$ can be regarded as significant. The results of the control group were surprising: 2 parameters (VCIN and FVC) showed a slight improvement, whereas 5 parameters (FEV1, PEF, MEF25, MEF50, and MEF75) deteriorated.

Based on the results of this study it can be stated that osteopathy has an influence on lung functions in patients with IPS.

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10 Table of Figures

11 Addendum

Treatment Group (% of rated value)																				
																	illness		duration
	VCIN		FVC		FEV1		PEF		MEF25		MEF50		MEF75		age	since	sex	of stay
	before	after	before	after	before	after	before	after	before	after	before	after	before	after		(years)		(days)
VP1	44	75	66	77	75	89	45	61	157	176	69	118	53	69	74	2	m	13
VP2	92	82	94	101	95	103	60	74	96	125	87	93	66	85	70	2	f	16
VP3	87	101	90	105	88	99	63	72	53	64	58	55	70	75	77	10	f	16
VP4	75	88	83	90	97	96	70	85	173	109	122	88	79	97	67	2	m	15
VP5	95	113	100	114	106	119	56	84	115	103	83	129	60	94	80	15	f	21
VP6	89	95	79	78	100	99	76	89	231	266	153	165	90	105	79	10	m	14
VP7	46	78	72	81	76	80	67	67	59	65	70	62	68	75	70	13	f	17
VP8	73	89	87	92	76	91	87	99	29	54	40	72	64	107	73	9	f	9
VP9	46	39	46	60	40	45	26	43	20	25	33	19	23	38	86	3	m	10
VP10	76	84	78	78	85	82	58	98	87	58	85	68	62	94	89	3	f	23
VP11	78	80	81	82	74	72	63	66	56	50	46	44	55	48	62	6	m	10
VP12	81	82	91	93	97	99	98	103	110	102	120	118	118	118	64	6	m	29
VP13	63	28	67	59	60	57	39	43	41	45	39	49	39	49	63	4	m	21
Mean value	72,69	79,54	79,538	85,4	82,23	87	62,154	75,69	94,3846	95,54	77,3077	83,077	65,1538	81,1				
Standard deviation	17,79	22,98	14,327	16,1	18,25	19,95	19,1	19,7	62,3078	65,41	36,5522	40,578	23,0646	24,8				
SEM	4,933	6,372	3,9732	4,47	5,061	5,5324	5,2967	5,464	17,2789	18,14	10,1365	11,253	6,39616	6,89				
T-Test	0,191		0,0098		0,026		0,0007		0,87777		0,40954		0,00146					

Control Group (% of rated value)																			
	VCIN		FVC		FEV1		PEF		MEF25		MEF50		MEF75		age	illness since (years)	sex	duration of stay (days)
	before	after	before	after	before	after	before	after	before	after	before	after	before	after				
VP1	95	73	87	75	96	80	73	69	127	80	133	108	77	79	65	6	f	9
VP2	108	110	113	114	114	114	87	87	69	78	149	140	92	91	78	5	f	21
VP3	96	89	93	86	95	85	84	81	73	51	110	77	95	83	73	12	f	19
VP4	77	71	82	80	87	87	84	75	66	96	94	115	89	86	78	5	f	17
VP5	111	85	116	221	124	145	110	128	113	44	114	34	110	83	85	5	f	19
VP6	89	88	91	94	103	107	96	113	145	156	113	100	103	115	76	3	f	13
VP7	112	141	94	80	100	91	90	95	88	107	89	85	102	108	67	2	f	23
VP8	103	116	122	130	131	126	107	84	164	47	167	145	137	101	90	5	m	10
VP9	101	95	103	99	100	97	69	73	61	69	94	92	76	78	64	2	f	11
VP10	90	109	105	113	122	124	95	90	176	148	140	137	104	103	71	3	f	15
VP11	84	79	79	79	74	67	74	68	39	22	48	31	74	52	76	4	f	22
VP12	94	101	125	120	112	109	84	67	59	65	75	77	89	77	64	8	f	18
VP13	76	83	81	87	95	94	64	68	211	102	98	108	78	82	73	3	m	17
Mean value	95,08	95,38	99,308	106	104,1	102	85,923	84,46	107	81,92	109,538	96,077	94,3077	87,5				
Standard deviation	11,84	19,7	15,871	38,8	15,98	21,525	13,883	18,66	53,535	39,54	32,1289	36,068	17,4947	16,4				
SEM	3,284	5,463	4,4014	10,8	4,432	5,9693	3,85	5,174	14,8461	10,97	8,90986	10,002	4,85155	4,54				
T-Test	0,943		0,442		0,413		0,659		0,08326		0,07357		0,11109					

Detailed data material is available on a CD, attached to this thesis.