대한침구학회지 제23권 제5호(2006년 10월)
The Journal of Korean Acupuncture & Moxibustion Society

원 저

# Study of the Relation of the Autonomic Nerve System and *Sa-am* Acupuncture(心正格) Treatment by the Heart Rate Variability

Lim Dae-jung, Lee Hyun-jin, Hwang Ji-hye, Cho Hyun-seok and Kim Kyung-ho

Department of Acupuncture & Moxibustion, College of Oriental Medicine, Dongguk University

## Abstract


## HRV(Heart Rate Variability)를 통한 舍岩鍼法 중 心正格 자침과 자율신경실조의 상관성 연구

**임대정 · 이현진 · 황지혜 · 조현석 · 김경호**

**동국대학교 한의과대학 침구학교실**

*목적* : 심박수 변이도(Heart Rate Variability. HRV)를 통해 사암침법 치료법 중 심신 질환에 많이 적용되는 심정격 자침법과 자율신경계와의 관계를 살펴보고자 하였다.

*방법* : 2006년 5월 1일부터 2006년 6월 31일까지 2개월간 특별한 과거력이 없는 건강인을 대상으로 실험군 37명을 사암침법 심정격을 자침하고 시술 전후에 HRV를 측정하여 별무처치 상태로 안정을 취한 후 측정한 대조군 21명과 비교하였다. 결과로 얻은 MHRT, SDNN, RMSSD, TP, LF, HF, LF/HF ratio 등의 수치 변화를 비교해 기록 시간 동안의 평균 심박수, 외부 스트레스에 대한 심박동의 변화상태, 심장에 관여하는 자율신경 중 부교감신경의 활동, 교감신경과 부교감신경의 균형 상태 등을 분석하였다.

*결과* : 1. MHRT는 실험군에서 유의성이 있는 것으로 나타났다.
2. SDNN는 실험군 대조군 모두 통계적인 유의성이 없었다.
3. RMSSD은 실험군 대조군 모두 통계적인 유의성이 없었다.
4. TP는 실험군 대조군 모두 통계적인 유의성이 없었다.
5. LF, HF은 실험군 대조군 모두 통계적인 유의성이 없었다.
6. LF/HF ratio는 실험군에서 유의성이 있는 것으로 나타났다.


· 접수 : 2006년 9월 8일 · 수정 : 2006년 9월 8일 · 채택 : 2006년 9월 8일
· 교신저자 : 임대정, 경기도 성남시 분당구 수내동 87-2 동국대학교 분당한방병원
Tel. 031-710-3734 E-mail : lthealer@naver.com

*결론* : 부교감신경과 교감신경의 비교 지표로 다용되는 LF/HF ratio가 유의한 차이를 보여 심정격 자침이 자율신경계의 항진을 완화시키는 것으로 사료된다. 향후 환자의 병인과 상태에 따라 실증과 허증으로 구분하여 시술하는 등의 추가적인 연구가 필요할 것으로 사료된다.

*핵심단어* : Sa-am Acupuncture, Heart Rate Variability, Autonomic nerve system

# I. Introduction

Stress reaction can be shown widely in the systems of psychology, endocrinology, immunology and so on. If we regard this stress reaction as homeostasis which is maintaining the equilibrium of the inner parts of the body from the disturbance from the outer world, maintainance of homeostasis can mostly be regulated by the activities of the autonomic nerve system[1]. Stress promotes catecholamine from the autonomic nerve system, and this activates the sympathetic nerve system. As the sympathetic nerve system is activated, high blood pressure, tachycardia, vertigo, anxiety, diaphoresis, myotonic reaction and others can happen. If the sympathetic nerve system is being kept stimulated for a long time, hypertension, cardiac disease and others can occur. On the other hand, the parasympathetic nerve system has the function of recovering to the state of relaxation from the stress reaction. Autonomic imbalance is the syndrome that people suffer from various symptoms accompanying no organic lesions and no psychological disorders by losing the harmonies between the sympathetic and parasympathetic nerve systems[2].

Sa-am Acupuncture in the clinical practice is applied to various diseases including the autonomic imbalance. Sa-am Acupuncture, unlike Che-chim method, doesnot have the potential danger of harming the organs as the practitioner of Sa-am Acupuncture only takes the acupoints that are below knee and elbow joints, and it is the method that uses five Su points with the manipulation of reinforcing and dispersing according to the principle of the Five Phases. It makes the practitioner to use less than eight acupoints which are really significant and excellent in treating the patient[3], and the Sim-Jung-Gyuk(心正格) of Sa-am Acupuncture is widely used in dealing with stress reaction, the symptoms of palpitation and chest discomfort[4].

Among the methods of evaluating the effects of the autonomic nerve system, the analysis on the periodical changes of heart rates which are affected by the Central Nerve System, baroceptors, and chemoreceptors can be used in evaluating the effects of the autonomic nerve system in many clinical trials[5]. In particular, the analysis on the autonomic nerve system using the Heart Rate Variability which is the noninvasive way of analyzing the autonomic nerve system is known as that it has the ability to observe the equilibrium between the sympathetic and paratsympathetic nerve systems[6]. There were quite many trials to make the Heart Rate Variability to be presented quantitatively with using the computer. Among these trials, power spectral analysis is one of the methods that is widely used in analyzing the Heart Rate Variability. The method can make it possible to present periodical changes with every frequencies separated from one another and express the ranges of the changes quantitatively[7].

When we look into the recent studies, there are the studies on measuring the effects of Sa-am Acupuncture in clinical trials or on the relationship between the acupoints of Che-chim method and the autonomic nerve system by using the HRV. But we never come across the studies

on the relationship between Sim-Jung-Gyuk(心正格) of Sa-am Acupuncture and the autonomic nerve systems.

We hereby report the significant results that we obtained from studying on the relationship between the autonomic nerve system and Sim-Jung-Gyuk(心正格) of Sa-am Acupuncture[8] that is widely used in stress reaction and symptoms of palpitation and chest discomfort with use of the HRV.

# Ⅱ. Methods

## 1. Period

This study was performed for two months, from May first, 2006 to June thrity first, 2006.

## 2. Subjects

The subjects of the Sa-am Acupuncture Group (心正格) were the 37 students from Oriental Medicine Department of ○○ University who did not have any disease or past history as below, and the subjects of the control group were also 21 adults who did not have any disease or past history as below.

① one who has the problem of the central nerve system including stroke
② one who has the mental illness
③ one who has the cardiovascular disease
④ one who has the endocrinological disease
⑤ one who is taking the medicine that affects the autonomic nerve system

## 3. Acupuncture treatment

The HRV of the subjects were measured after each of the subjects being relaxed in a quiet room with the supine position. The HRV of the control group were remeasured after 15 minutes' relaxation. The male subjects of the Sa-am Acupuncture Group(心正格) were needled on only the left-handed acupoints while the female subjects were needled on the right. Both male and female subjects were needled on the acupoints of Daedon(LR1) and Sobu(HT8) with reinforcing manipulation, and on the acupoints of Eumgok(KI10) and Sohae(HT3) with dispersing manipulation. The manipulation lasted for 3 or 5 minutes, and the needles were kept intact for 10 minutes after the manipulation. After 10 minutes' of being kept intact, the needles were taken off, and the HRV of the subjects were remeasured. The manipulation of reinforcement-reduction by puncturing along and against the direction of the Meridian(迎隨補瀉), reinforcement-reduction by lifting and thrusting the needle(提揷補瀉), reinforcement and reduction by opening and closing(開闔補瀉), tonifying and purging method according to the strength of twirling the needle(捻轉補瀉), and breathing reinforcement-reduction method(呼吸補瀉) were used, and the needles used in the treatment were 0.30mm in diameter, 30mm in length(stainless steel, Dong Bang Acupuncture Manufacturing Company, Korea).

## 4. The measurement of the HRV

The HRV was measured with the electrodes attached to both wrists and left ankle for 5 minutes by using the SA-3000P(Medicare co. Ltd. Korea), the sphygmograph for the HRV. In this study, we calculated Mean Heart Rate(MHRT), Standard Deviation of all the Normal RR intervals(SDNN), and Root Mean Square of Successive Differences Between The Normal Heart Beats(RMSSD) as well as Total Power(TP), LF(Low Frequency), and High Frequency(HF) after measuring the HRV for 5 minutes. Using these data, we figured out normalized low frequency power(LF norm), normalized high frequency power(HF norm), and LF/HF ratio. we analyzed the equilibrium of the sympathetic and parasympathetic nerves, and the activities of the autonomic nerves that have to do with heart, the

changes of the heart rates due to stress from the outside of the body, the mean heart rates acquired from the recording time of the MHRT, SDNN, RMSSD, TP, LF, HF, and LF/HF ratio gained by the HRV of the Sa-am Acupuncture Group(心正格) and the control group.

### 5. Statistics

To compare MHRT, SDNN, RMSSD, TP, LF, HF, and LF/HF ratio of the Sa-am Acupuncture Group(心正格) with those of the control group, we did paired T-test, and used SPSS 12.0 for the statistics, and examined these data in the significance level of 5%.

## Ⅲ. Results

### 1. Age and Sex

In the Sa-am Acupuncture Group(心正格), there were 26 people who were in their twenties, 10 people who were in their thirties, 1 person who were in his forties. 29 people were men, and 8 people were women in this group.

In the control group, there were 4 people who were in their twenties, 6 people who were in their thirties, 5 people who were in their forties, 6 people who were in their fifties. The average age of this group was 41.4, and 7 people were men, and 14 people were women in this group.

### 2. Comparison of the values of the Sa-am Acupuncture Group(心正格) and the control group

#### 1) MHRT

MHRT of the control group decreased from 73.70±11.39 to 72.86±10.82, but it wasnot statistically significant (p=57), MHRT of the Sa-am Acupuncture Group(心正格) decreased from 69.46±9.69 to 66.87±7.90, and it was significant(p=0.00)(Fig. 1).

#### 2) SDNN

SDNN of the control group decreased from 38.09± 15.02 to 38.03±15.99, but it wasnot statistically significant (p=0.98), SDNN of the Sa-am Acupuncture Group (心正格) increased from 53.76± 22.14 to 54.68± 26.21, but it wasnot statistically significant(p=0.79)(Fig. 2).

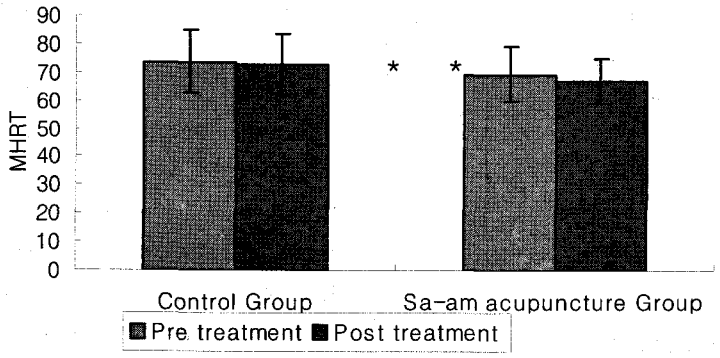


Fig. 1. Comparison of MHRT Results of Control Group with that of Sa-am Acupuncture (心正格) Group
* p<0.05, compared pre treatment with post treatment.

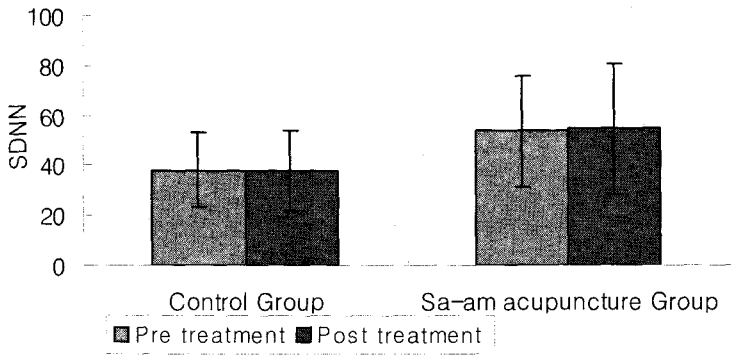


Fig. 2. Comparison of SDNN Results of Control Group with that of Sa-am Acupuncture (心正格) Group

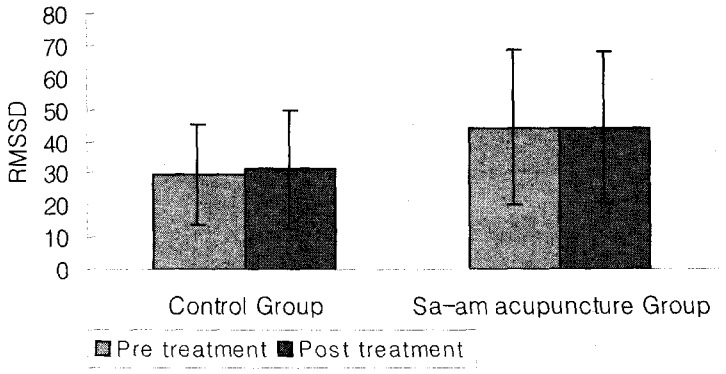


Fig. 3. Comparison of RMSSD Results of Control Group with that of Sa-am Acupuncture (心正格) Group

### 3) RMSSD

RMSSD of the control group increased from 29.49±15.73 to 31.25±18.48, but it wasnot statistically significant(p=0.52). RMSSD of the Sa-am Acupuncture Group(心正格) increased from44.12± 24.27 to 44.34± 23.81, but it wasnot statistically significant(p=0.92)(Fig. 3).

### 4) TP

TP of the control group increased from1151.63± 996.73 to 1152.31±887.77, but it wasnot statistically significant(p=0.99). TP of the Sa-am Acupuncture Group(心正格) increased from2716.28±2904.84 to 2772.32±2795.93, but it wasnot statistically significant (P=0.91)(Fig. 4).

### 5) LF, HF

LF of the control group decreased from 393.02± 527.06, to 305.45±306.67, and HF of the control group increased from 261.88±253.54 to 328.00± 476.25. But it wasnot statistically significant. (p=0.34, 0.36) LF of the Sa-am Acupuncture Group (心正格) decreased from 1202.14±1797.29 to1028.60± 1535.89, and HF of the Sa-am Acupuncture Group (心正格) increased from 525.73±598.43 to 612.59± 738.12. But it wasnot statistically significant (p=0.50, 0.32)(Fig. 5, 6).

### 6) LF/HF ratio

LF/HF ratio of the control group decreased from 1.74±1.46 to 1.55±1.39, but it wasnot statistically significant(p=0.22). LF/HF ratio of the Sa-am Acupuncture Group(心正格) decreased from 33.36± 4.51 to 1.98±1.79, and it was significant(p=0.02)(Fig. 7, Table 1).

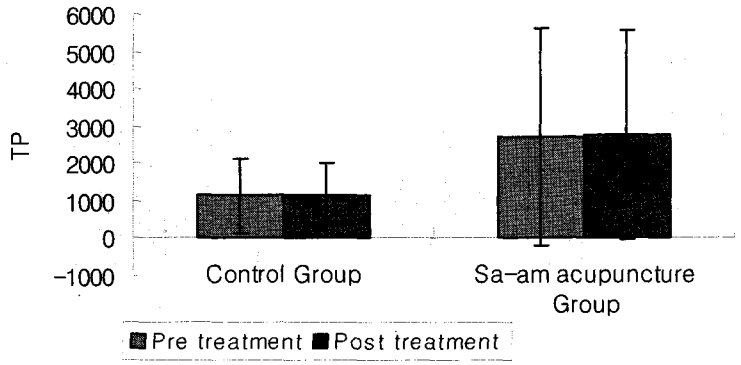


Fig. 4. Comparison of TP Results of Control Group with that of Sa-am Acupuncture (心正格) Group

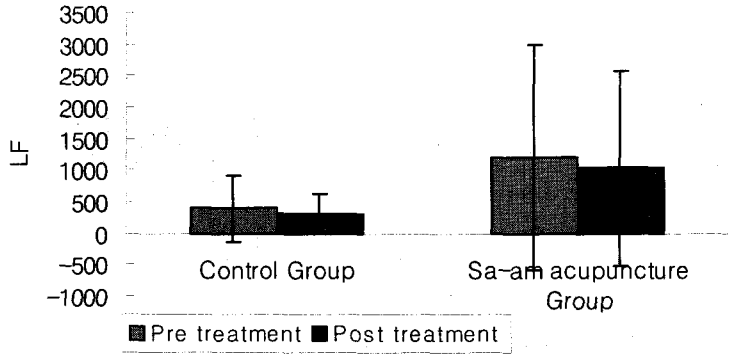


Fig. 5. Comparison of LF Results of Control Group with that of Sa-am Acupuncture (心正格) Group

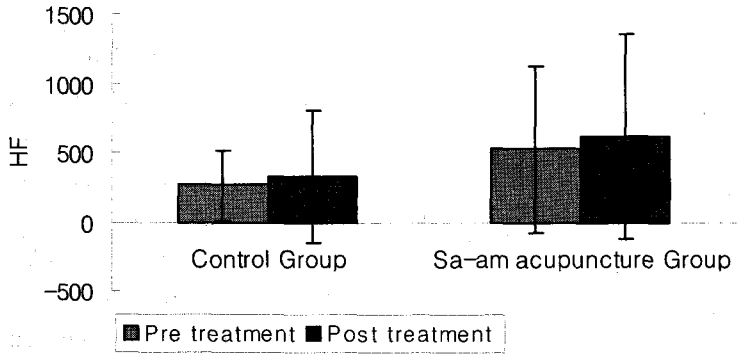


Fig. 6. Comparison of HF Results of Control Group with that of Sa-am Acupuncture (心正格) Group

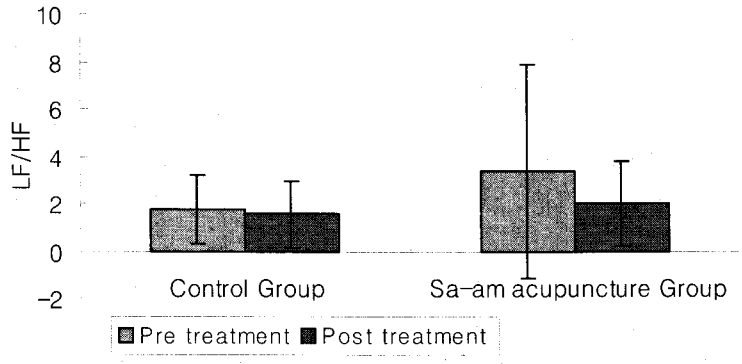


Fig. 7. Comparison of LF/HF ratio Results of Control Group with that of Sa-am Acupuncture (心正格) Group

* $p<0.05$, compared pre treatment with post treatment.

Table 1. Comparison of Heart Rate Variability Results of Control Group with that of Sa-am Acupuncture (心正格) Group

| | Control Group | | p-value | Sa-am Aacupuncture (心正格) Group | | p-value |
|---|---|---|---|---|---|---|
| | Before | After | | Pre treatment | Post treatment | |
| MHRT | 73.70±11.39 | 72.86±10.82 | 0.57 | 69.46±9.69 | 66.87±7.90 | 0.00* |
| SDNN | 38.09±15.02 | 38.03±15.99 | 0.98 | 53.76±22.14 | 54.68±26.21 | 0.79 |
| RMSSD | 29.49±15.73 | 31.25±18.48 | 0.52 | 44.12±24.27 | 44.34±23.81 | 0.92 |
| TP | 1151.63±996.73 | 1152.31±887.77 | 0.99 | 2716.28±2904.84 | 2772.32±2795.93 | 0.91 |
| LF | 393.02±527.06 | 305.45±306.67 | 0.34 | 1202.14±1797.29 | 1028.60±1535.89 | 0.50 |
| HF | 261.88±253.54 | 328.00±476.25 | 0.36 | 525.73±598.43 | 612.59±738.12 | 0.32 |
| LF/HF ratio | 1.74±1.46 | 1.55±1.39 | 0.22 | 3.36±4.51 | 1.98±1.79 | 0.02* |

* $p<0.05$, compared pre treatment with post treatment.

# Ⅳ. Discussion

The sympathetic nerves of the autonomic nerve system mostly activate the body into the "fight or flight" reaction through the secretion of norepinephrine from the postganglionic fibers and epinephrine from the adrenal medulla. The parasympathetic nerves work antagonistically against the sympathetic nerves through the secretion of acetycholine from the postganglionic fibers. To maintain the homeostasis of the body, the sympathetic and parasympathetic nerves should work together with making balance[9].

The sympathetic and parasympathetic nerves of the autonomic nerve system work on the internal organs in different ways. The full activation of the sympathetic nerves is needed to get powerful labors, increase heart rates and enhance blood sugar level for an emergency. The main physiological function of the sympathetic nerves can be summarized as the "fight or flight reaction". By the stimuli of the parasympathetic nerves that work independantly of the sympathetic nerves, the heart rates decrease, and the veins of the internal organs relax, and the activities of gastrointestinal system increase. The functions of the internal organs are mainly regulated by the neural reflexes of the autonomic nerves. In the most of the neural reflexes of the autonomic nerves, the

sensory nerves gather the informations, and the neural center that itself controls the activation of the preganglionic autonomic nerve is influenced not only by sensory inputs but also by the higher parts of the brain. The medulla as the part that controls itself the activations of the autonomic nerves is the center for controlling the cardiovascular, pulmonary, urogenital, digestive systems. The medulla itself reacts on the regulations of the higher parts of the brain sensitively, and the hypothalamus as the one part of the brain is the center for body temperature, starvation, thirst, and emotion. The limbic systems are related with the basic emotional impulses such as anger, fear, sex, and starvation[9].

One would have high blood pressure, tachycardia, vertigo, anxiety, diaphoresis, and myotonia as stress stimulates the secretion of catecholamine from the autonomic nerve system, and activates the sympathetic nerve system. If the sympathetic nerve system activates for a long time, one could have hypertension, cardiac diseases, and so on. On the other hand the parasympathetic nerve system recover to the state of relaxation from stress reaction[2].

Sim-Jung-Gyuk(心正格) as one of the treatment derived from Sa-am Acupuncture uses the manipulation of reinforcing the acupooints of Daedon(LR1), Sochung(HT9) and the manipulation of dispersing the acupoints of Eumgok(KI10), Sohae(HT3). Sochung(HT9) as Well Point of Heart Meridian of Hand Soeum is the acupoint that is applied in symptoms of epigastric pain, distressing fullness of the chest and hypochondrium, palpitation, hysterical reaction, dyspnea. Daedon (LR1) is Well Point of Liver Meridian of Foot Gworeum. If Daedon(LR1) as Point of Corresponding Years(天符穴) of Wood and Sochung(HT9) as Wood Point of Heart Meridian of Hand Soeum combinate and work together, they do act like the fire blown with the bellows. They make Heart Meridian of Hand Soeum flow smoothly so that symptoms of Gi deficiency and Gi stagnation made by deficiency of Heart Gi can disappear. Eumgok(KI10) as Sea Point of Kindney Meridian of Foot Soeum can be applied when treating dysfunctions of the urogenital system, and it plays a great role in regulating Heart Meridian of Hand Soeum of Fire as it is the Water Point of Kindney Meridian of Foot Soeum that represents kidney, the internal organ of Water. Sohae(HT3) has a nicname of GokJeol(曲節), and it can be applied as Sea Point of Kindney Meridian of Foot Soeum when treating chronic diseases and all the symptoms arisen by Heart Fire. Sohae(HT3), Water Point of Heart Meridian of Hand Soeum can eliminate the stenosis made by water retention disease and congested fluids that are made as the results of weaker Heart Yang's not pushing Gi well enough if it is put together with Eumgok(KI10), the Point of Corresponding Years of Water. Therefore, Sim-Jung-Gyuk(心正格) can be applied to the patient with palpitation due to fright, continuous violent palpitation, spermatorrhea, shortness of breath, spontaneous sweating, chest distress, distention in the gastric region with belching or nausea, vertigo, and epigastric tension[4,10,11].

The HRV test as one of the tests that evaluate the functioning of the autonomic nerves by the changes of heart rates is well known that it has the ability to reflect the states of the sympathetic and parasympathetic nerves. Rises and declines of the sympathetic and parasympathetic nerves is similar with the theory of Oriental Medicine that pronounces Oneness of Body and Mind in that the sympathetic and parasympathetic nerves work antagonistically to each other, influence the whole body, and reflect the mental state of the patient. The vital signs that come from the HRV test largely divides into data of time and data of frequencies. The Data of time is MHRT, MeanNN(mean of all the normal RR intervals), SDNN, and RMSSD. The data of frequencies if TP, VLF(very low frequency), LF, HF, and LF/HF ratio. The HRV is one of the data obtained from heart rates in chronological orders. The analysis of Time Domain is a means that we

can analyze P-P intervals quantitatively by applying the methods of techinque-statistics, and it also can be applied when we estimate the activities of autonomic nerves only with P-P time intervals. It has the merit that it can provide reliable and simple values of which applications and observations are made on the statistical backgrounds whereas it has the shortcoming that it doesnot provide sufficient data on the interactions between the sympathetic and parasympathetic nerves. The analysis of Frequencies Domain has the merit that it can easily provide sufficient data on the interactions between the sympathetic and parasympathetic nerves in that we can figure out quantitatively the changes of the autonomic nerves by analyzing the extents of changes of P-P intervals. HF is known as the indicator for the activities of the parasympathetic nerves when seen on physiological aspect, and clinical significance of LF and VLF has not been fully manifested. LF usually indicates the activities of the sympathetic nerve, but the sympathetic and parasympathetic nerves both can be shown in LF and it is a popular conception that the activities of the parasympathetic nerves are related with the baroreceptor when these two nerves, the sympathetic and parasympathetic are shown together in LF[12]. The indicator of the ability of regulating the autonomic nerves is represented as LF/HF ratio, the indicator for sympathovagal interaction much more than as the comparison indexes between the sympathetic and parasympathetic nerves[13]. In this study, we set up the group that didnot get any treatment from the practitioner as the control group, and set up the group that got the treatment of Sim-Jung-gyuk(心正格) from the practitioner as the Sa-am Acupuncture Group(心正格). Comparing the HRV before and after the treatment, we tried to understand whether Sim-Jung-Gyuk(心正格) of Sa-am Acupuncture influences the autonomic nerve system of the body or not.

There are many controversies going on the studies of acupuncture and ranges of activation of the autonomic nerves. Stein et al[14] reported that the threshold of pain and muscle sympathetic nerve activity(MSNA) increase after electro-stimulation of 2Hz on the acupoints of Hapgok(LI4) and Gokji(LI11) for 30 min. Holly R et al[15] reported that acupunture on the acupoints of Hapgok(LI4), Taechung(LR3), and Naegwan(PC6) doesnot regulate the changeability of MSNA which came from stress reaction in the normal subject. However, it is said that selecting these points for treating the patients with progressing heart failure has made the suppressing effect of acceleration of autonomic nerves caused by mental stress[16].

Many studies are recently being done to measure the HRV for the interactions between acupuncture and the autonomic nerve system. Eva et al[17] report that LF and HF both increased after the stimulation on the acupoint of Hapgok(LI4) of the normal subject, and it showed greater changes after the stimulation than during the stimulation. Shi et al[18] report that HF didnot change after manipulation and eletro-stimulation of the acupoint of Naegwan(PC6) of the patient with coronary artery disease, but LF significantly decreased, and LF/HF also decreased after the electro-stimulation, and decline of LF after the electro-stimulation made a peak and remained that way for 20~30 minutes. Kim et al[19] also report that heart rates significantly decreased after the electro-stimulation on the acupoints of Joksamni(ST36) and Sanggeoheo(ST37) of the normal subject, and SDNN significantly increased, and there werenot significant changes in frequencies. Kim et al[20] also report that LF significantly decreased as the acupoint of Sobu(HT8) is needled after having mental stress. Kim et al[21] report that LF and tendencies to be Hot or Cold resulted in having the significant relationship with each other as the HRV test showed the results of subjects who had been electro-stimulated on the acupoint of Sinmun (HT7) after distinguishment of the subjects' tendencies to be Hot or Cold.

In this study, the normal ranges of the values

of MHRT which means the mean heart rate for the recording time of the Sa-am Acupuncture Group(心正格) and the control group are said to be from 60 to 90. Tachycardia that makes MHRT go up is usually shown when we are in stress, anxiety, hyperthyroidism, and take the stimulants. Bradycardia that makes MHRT go down is usually shown when we have an acute heart attack, too many drugs, hypothyroidism. In this study, MHRT of the control group decreased from 73.70±11.39 to 72.86±10.82, but it wasnot siginificant statistically(p=0.57). MHRT of the Sa-am Acupuncture Group(心正格) decreased from 69.46± 9.69 to 66.87±7.90, and it was statistically significant.(p=0.00) SDNN which means the standard deviation of RR intervals between the Sa-am Acupuncture Group(心正格) and the control group is said to be in normal range when it is over 30, but the decrease of the values of SDNN means that it isnot good enough to maintain the homeostasis of the autonomic nerve system appropriately against the changes of the environs inside and outside of the body. In this study, SDNN of the control group decreased from 38.09±15.02 to 38.03±15.99, but it wasnot statistically significant(p=0.98). SDNN of the Sa-am Acupuncture Group(心正格) increased from 53.76± 22.14 to 54.68±26.21, but it wasnot statistically significant (p=0.79). It implies that the risk of having cardiac diseases would be higher when RMSSD which is the square root of the mean value a square of discrepancies of contiguous RR intervals goes under 10. In this study, RMSSD of the control group increased from 29.49±15.73 to 31.25±18.48, but it wasnot statistically significant(p=0.52), and RMSSD of the Sa-am Acupuncture Group(心正格) increased from 44.12±24.27 to 44.34±23.81, but it wasnot statistically significant(p=0.92). The values of TP that means total power including VLF, LF, and HF of the recording time between the Sa-am Acupuncture Group(心正格) and the control group is said to be in normal range when it is over 1000, and it implies that the decrease of TP shows the lesser ability of regulating the body due to the chronic diseases or stress. In this study, TP of the control group increased from 1151.63±996.73 to 1152.31±887.77, but it wasnot statistically significant(p=0.99). TP of the Sa-am Acupuncture Group(心正格) increased from 2716.28± 2904.84 to 2772.32±2795.93, but it wasnot statistically significant(p=0.91). Comparing LF and HF which is the low frequency range and high frequency range for the recording time between the groups, LF of the control group decreased from 393.02±527.06 to 305.45±306.67, and HF of the control group increased from 261.88±253.5 to 328.00± 476.25, but it wasnot statistically significant (p=0.34, 0.36). LF of the treatment decreased from 1202.14±1797.29 to 1028.60±1535.89, and HF of the treatment increased from 525.73±598.43 to 612.59± 738.12, but it wasnot statistically significant (p=0.50, 0.32). Ranges of 0.5 to 2 are normal ranges of LF/HF ratio which is widely used as the indexes of ability of regulating the autonomic nerve system between the groups, and this is in proportion to the activities of the sympathetic nerve, and is in inverse proportion to the activities of the parasympathetic nerve. In this study, LF/HF ratio of the control group decreased from 1.74±1.46 to 1.55±1.39, but it wasnot statistically significant(p=0.22), and LF/HF ratio of the Sa-am Acupuncture Group(心正格) decreased from 3.36± 4.51 to 1.98±1.79, and it was statistically significant (p=0.02). As to the results, we speculate that Sim-Jung-Gyuk(心正格) lessens exasperation of the autonomic nerve system.

This study had the limitation to obtain significant results as the number of subjects was small. It was difficult to get statistical significance and consistent results on a small popluation as the HRV happens to have a large error by individual variations like subjects' age, sex, physique, cardiovascular capacity, environs during the treatment and so on. Generally applying the Sa-am Acupuncture to the subjects, we first distinguish excess syndrome and deficiency syndrome of the subjects according to causes of their diseases and their states of being, and apply

the different methods respectively. But the same method was kept on in this study. Therefore, we consider that additional experiments on how Sa-am Acupuncture(心正格) does affect the autonomic nerve system would be needed after this study.

# V. Conclusion

To know about the relationship between the extents of autonomic imbalance and the group that had the treatment of Sa-am Acupuncture(心正格) Group, we measured the results of the HRV of the control group and the Sa-am Acupuncture Group(心正格). Comparing the changes of the numerical values of MHRT, SDNN, RMSSD, TP, LF, HF, and LF/HF ratio, we come to have such results as follows.

1. MHRT came to be significant in the Sa-am Acupuncture Group(心正格).
2. SDNN wasnot statistically significant in both the Sa-am Acupuncture Group(心正格) and the control group.
3. RMSSD wasnot statistically significant in both the Sa-am Acupuncture Group(心正格) and the control group.
4. TP wasnot statistically significant in both the Sa-am Acupuncture Group(心正格) and the control group.
5. LF and HF werenot statistically significant in both the Sa-am Acupuncture Group( 心正格) and the control group.
6. LF/HF ratio came to be significant in the control group.

# VI. References


1. Korean Association for Research of Psychosomatic Stress. Understanding How Stress affects the Body. Seoul : SinGwang Publishing Co. 1997 : 23, 152, 313.
2. Min SG. Current Psychology. Seoul : Il Jo Gak. 2000 : 463.
3. Ahn BS, Lee BR. A Casuistics of Two Whabyong Cases by Simseunggyok of the Saam Acupuncture. Daejeon University.
4. Kim GW. The Essays of Sa-am Acupuncture. Seoul : Cho Rak Dang 2006.
5. Akselrod S, Gordon D, Uble FA, Shannon DC, Barger AC, Cohen RJ. Power spectral analysis of heart rate fluctuation : a quantitative probe of beat-to-beat cardiovascular control. Science. 1981 : 213, 221, 222.
6. Pomeranz B, Macaulay R, Caudill M, Kuts I, Adam D, Gordon D, et al. Assessment of autonomic function in humans by heart rate spectral analysis. Am J Physiol. 1985 ; 248 : H151-3.
7. Akselrod S, Gordon D, Madwed JB, Snidman NC, Shannon DC, Cohen KJ. Hemodynamic regulation : Investigation by spectral analysis. Am J physiol. 1985 ; 249 : H867-75.
8. 김관우, 舍岩鍼法 隨想錄. 도서출판 초락당. 2006.
9. Park IG, Bu MJ, Jung HG. Physiology 7th ed. Seoul : Life Science. 2004 : 150-163
10. Ahn YG. A Series of Acupuncture. Seoul : Sung Bo Sa. 1991.
11. Department of Acupuncture, Collaboration of Oriental Medicine Univ. Nationwide. Acupuncture 2nd vol. Seoul : Jip Moon Dang. 1998.
12. Lee TG, Choi KM, Park YB, Dept. Biofunctional Medicine & Diagnos, Gyunghee Univ. The Study of Relation between the HRV and Symptoms. The Journal Of Korea Institute Of Oriental Medical Diagnostics. 2003 ; 7(2) : 83-100.
13 Breger RD, Saul JP, Cohen RJ. Transfer function analysis of autonomic regulation. Am J physiol. 1989 ; 256 : H142-52.
14. Stein Knardahl, Mikael Elam, Bengt Olausson, B. Gunnar Wallin. Sympathetic nerve activity

after acupuncture in humans. 1998 ; 75 : 19-25.

15. Holly R. middlekauff, Jun Liang yu and Kakithui. Acupuncture on reflex responses to mental stress in humans. Am J Physiol Regulatory Integrative Comp Physiol. 2001 ; 280 : R1462-R1468.
16. Holly R. Acupuncture inhibits sympathetic activation during mental stress in advanced heart failure patients. J of Cardiac Failure. 2002 ; 8(6) : 399-406.
17. Eva haker, Henrik Egekvist, Peter Bjerring. Effect of sensory stimulation(acupuncture) on sympathetic and parasympathetic activities in healthy subjects. J Autonomic Nervous system. 2000 ; 79 : 52-59.
18. Shi X, Wang ZP, Liu KX. Effect of acupuncture on heart rate variability in coronary heart disease patients. Zhongguo Zhong Xi Yi Jie He Za Zhi. 1995 ; 15(9) : 536-538.
19. Kim Min Su, Gwag Min A, Jang U Seog, Lee Gi Tae, Jeong Gi Sam, Jeong Tae Yeong, Seo Jeong Cheol, Seo Hae Gyeong, An Hui Deog. Effect of Electroacupuncture Stimulation on Heart Rate Variability in Healthy Adults. The Journal of Korean Acupuncture & Moxibustion society. 2003 ; 20(4) : 157-169.
20. Jeung Shin Kim, Wook Hwang, Ki Tae Bae, Sang Soo Nam, Yong Suk Kim. Effect of Acupuncture for Mental Stress on *Short-term Analysis* of Heart Rate Variability(HRV). The Journal of Korean Acupuncture & Moxibustion society. 2004 ; 21(5,) : 227-239.
21. Dong Hoon Kim, Dong Hoon Yang, Eun Jung Kim, Dong Woo Nam, Yeon Cheol Park , Young Jae Park, Sang Chul Lee, Young Bae Park. A Study on the Effect of Interaction between Acupuncture at Shinmun (HT7) and Subject's Cold or Heat Tendency on Heart Rate Variability. The Journal of Korean Acupuncture & Moxibustion society. 2006 ; 23(1) : 25-38.