The Applications of Four Fingers Theory: The Proof of 66 Acupoints under the Human Elbow and Knee

Chih-I. Tsai, Yu-Chien. Lin

Abstract—Through experiences of clinical practices, it is discovered that locations on the body at a level of four fingerbreadth above and below the joints are the points at which muscles connect to tendons, and since the muscles and tendons possess opposite characteristics, muscles are full of blood but lack qi, while tendons are full of qi but lack blood, these points on our body become easily blocked. It is proposed that through doing acupuncture or creating localized pressure to the areas four fingerbreadths above and below our joints, with an elastic bandage, we could help the energy, also known as qi, to flow smoothly in our body and further improve our health. Based on the Four Fingers Theory, we understand that human height is 22 four fingerbreadths. In addition, qi and blood travel through 24 meridians, 50 times each day, and they flow through 6 cun with every human breath. We can also understand the average number of human heartbeats is 75 times per minute. And the function of qi-blood circulation system in Traditional Chinese Medicine is the same as the blood circulation in Western Medical Science. Informed by Four Fingers Theory, this study further examined its applications in acupuncture practices. The research question is how Four Fingers Theory proves what has been mentioned in *Nei Jing* that there are 66 acupoints under a human's elbow and knee. In responding to the research question, there are 66 acupoints under a human's elbow and knee. Four Fingers Theory facilitated the creation of the acupuncture naming and teaching system. It is expected to serve as an approachable and effective way to deliver knowledge of acupuncture to the public worldwide.

Keywords—Four Fingers theory, Meridians circulation, 66 Acupoints under a human's elbow and knee, acupuncture.

I. Introduction

A. The Origin of Four Fingers Theory

IN 1997, two women came seeking advice. One woman, had suffered a stroke but still devoted herself to volunteer work, and hoped to conquer the muscle weakness she experienced, in order to be able to collect donations more effectively. The second woman suffered from varicose veins, the result of prolonged periods of standing. She was not able to walk or stand for long periods because of the aching and heavy sensation she experienced in her legs. She hoped that by relieving her pain she would be free to travel the world. Both women were cured through acupuncture and by placing localized pressure on points, four fingerbreadths above and below our joints with an elastic bandage. In the 19 years that followed, more than 10,000 people complaining of similar symptoms recovered after receiving this acupuncture therapy. During this period, researches in the field of Traditional

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Chinese Medicine, Anatomy, Physiology, Sports Medicine and Biomedical Engineering were conducted for the purpose of explaining this phenomenon. In 2008, the *Four Fingers Theory* was published with aim of explaining how patients recovered from their physical problems by undertaking this treatment.

The distances between the joints of the human body are carefully designed to facilitate transmission and resonance. As Fig. 1 shows, if four-fingerbreadth is a unit of measurement, our head would be equal to one four-fingerbreadth, the upper arm would be equal to two four-fingerbreadths, the forearm would be equal to three four-fingerbreadths, the calf would be equal to four four-fingerbreadths, the thigh would be equal to five four-fingerbreadths and body would be equal to six four-fingerbreadths. This new unit of measurement four-fingerbreadth was called as one Noah (1N). Noah is the English name of Chih-I. Tsai, who proposed the Four Fingers Theory in 2008. Then, we can predict the distance from the lowest to the highest point of a human being in a natural standing position by this new unit: head (3N) + neck (1N) + body (6N) + hip (male:1N, female:2N) + thigh (5N) + knee (1N) + calf (4N) + sole (1N) = 22N (male) and 23N (female). Thus, it is concluded that the average of human height is 22 four-fingerbreadths, which is also referred to as 22N. The measurement 22N is also equal to the horizontal distance between two outstretched stretching arms [1].
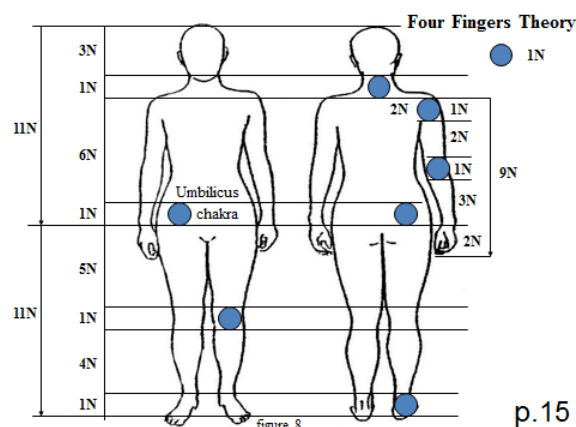

Fig. 1 Four Fingers Theory

B. The Relationship between the Total Length of the Meridians and Four Fingers Theory

According to *Nei Jing* [5], [6], the length of the meridians is 1,620 cun (540N). Are there any relationship between 1620 cun and Four Fingers Theory? The meridian network includes: jing luo, which are Yin meridians and the meridians of the arms and

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legs, and jing bei, which are Yang meridians and meridians of the head and body. *Nei Jing* also says, "The Meridians move the qi and blood. As a result, Yin and Yang become regulated. Tendons and bones become nourished. Joints become strengthened." Meridians work as a network system, transporting and distributing qi and blood. Thus, the length of the meridian is equal to the length of the blood vessel. The total length of the meridians (constant) = 1620 inches (constant in *Nei Jing*) = the total length of the meridians of the arms + the total length of the meridians of the legs = the total length of the 12 meridians of the arms + the total length of the 12 meridians of the legs + the total length of the 12 meridians laterally and symmetrically distributed on both sides of the head + the total length of the 12 meridians laterally and symmetrically distributed on two sides of the body = 540N (N is the constant in Four Fingers Theory) = the horizontal distance between one's two stretching hands (22N) ×12 + the distance from the lowest to the highest point of the human body while in a natural standing position (23N) × 12 = 22N × 6 meridians × 2 sides + 23N × 6 meridians × 2 sides = 45N × 12 = 540N. [2], [18]

From the derivational process above, we know that the meridian network system has a close relationship with Four Fingers Theory. In addition, the meridian system and the blood circulation system follow the same pathways. We could further understand the human height is 22N and the total length of the meridian is 540N. Besides, the constant in Four Fingers Theory is N, which is equal to the length of four fingerbreadth and 3 cun. Thus, it is concluded that there is a close relationship between the meridian system and cun. And both are very much related to Four Fingers Theory. Furthermore, cun is a traditional Chinese unit of length and is used to measure acupuncture points on the human body. [2]

Circadian rhythms, present in most living species, makes it possible for organisms to coordinate their biology and behavior with daily environmental changes in the day-night cycle.

Humans, therefore, are capable of observing and analyzing the recurring signal, which is also known as a constant. And a constant in this study is a number whose value cannot be changed. Qi and blood flow through the meridians, which are fixed spaces and this phenomenon, is closely related to Four Fingers Theory. However, for a greater understanding of the average speed that qi and blood flow through the meridians and how much time they need to spend traveling through one meridian, we need to analyze a person's breathing and heart rate. [2], [16]

The earth revolves around the sun in its orbit, and completes one full orbit every one year. (A solar year is equal to 365 days, while a lunar year is equal to 364 days.) The earth rotates on its axis in 24 hours in relation to the sun and is defined as a day. The period of time when the sun is above the local horizon is called daytime. Because noon is defined as 12 o'clock in the daytime, a day can be further divided into morning and afternoon. The period of time when the moon is above the local horizon is called night. Thus, a day can be divided into three parts: morning, afternoon, and night. The average number of human breaths, which includes breaths in and breaths out, is 27,000 times per day = 13,500 times when breathing in or when breathing out. Similarly, the normal human heart rate is four (one breath in or out for every four heartbeats) × 27,000 beats = 108,000 beats per day. From experiences of clinical practices, it is found that if one bent the thumb and measure the length of the internal fold formed by the distal phalangeal articulation and the mid-phalange, the length could be defined as one cun. And, four-fingerbreadth is equal to three cun. The average height of one male is 22N=Height (H), which is also equal to the horizontal distance between the two outstretched hands (W). Thus, it is concluded that 22N=H=W. [2], [10]
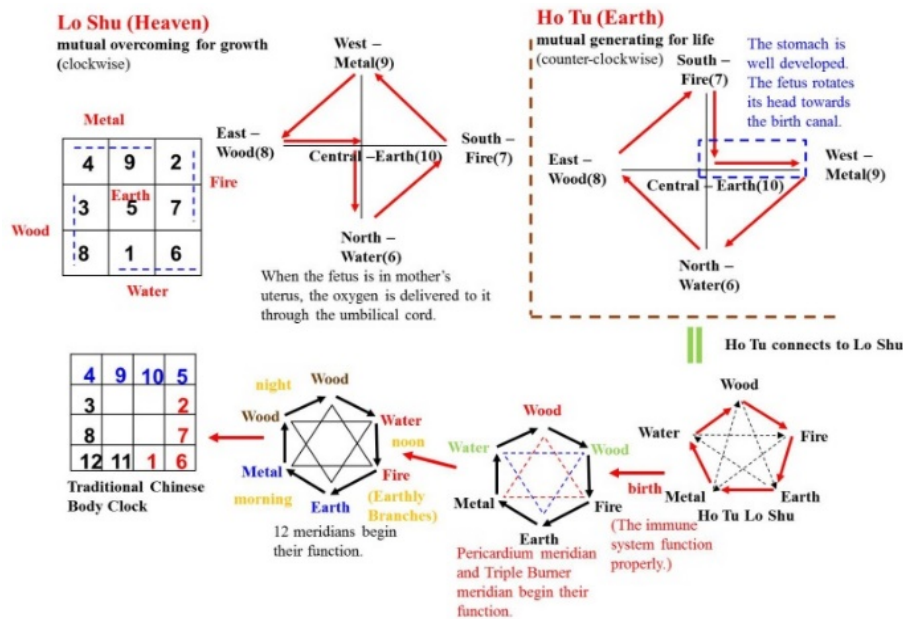

Fig. 2 The process of human development and the origin of the 12 meridians

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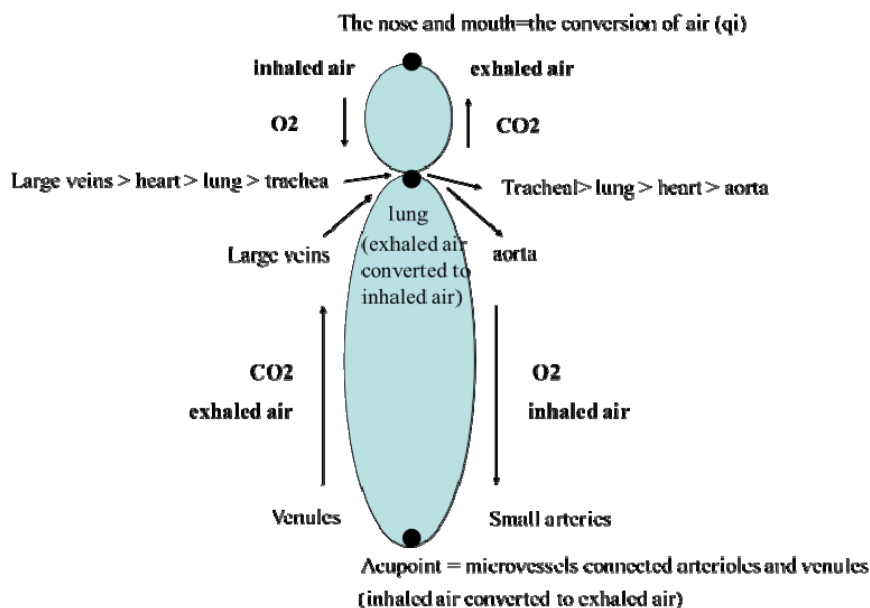International Journal of Health and Medical Engineering
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Fig. 3 The model of breathing

Fig. 2 shows the process of human development and the origin of the 12 meridians. As we can see from Fig. 2 below, the Magic Squares demonstrate the stages of human embryo development. It follows the Wu Xing mutual overcoming cycle: Wood parts Earth, Earth absorbs Water, Water extinguishes Fire, Fire melts Metal, and Metal chops Wood. Only until the stomach (10) is well developed can the fetus rotate its head towards the birth canal and be delivered. While the fetus is in mother's uterus, oxygen is delivered through the umbilical cord. This oxygenated blood is returned to the fetus's heart and then pumped out to the rest of the body. After the baby is born, fetal circulation transitions pulmonary circulation. The newborn, thus, can breathe independently and qi-blood circulation also begins at this moment. [2], [3], [10], [16]

C. Constants Inductive and Deductive Method

The power that promoting qi-blood circulation = pulmonary respiration (A) + heartbeat (B).

A:B=1:8 (1 breath for every 8 heartbeats)

∵ The average number of human breaths is 27,000 per day = 13,500 times when breathing in or breathing out (as shown in Fig. 3). [14]

Hypothesis 1. If the times of qi and blood circulating the 12 meridians per day are X zhou, the qi and blood flow is 1,620X cun (C1).

Hypothesis 2. If the qi and blood flow for Y cun when taking one breath, the total distance they flow per day is 13500Y cun (C2).

∵ C1=C2 ∴ 1620X=13500Y X:Y=50:6

∴ The great circulatory circle (dà zhōu tiān), the total times qi and blood flow through all the meridians, is 50 zhou per day. That is, qi and blood flow through all the meridians, 50 times per day. As well, qi and blood travel 6 cun for every breath (the constant in *Nei Jing*. [2], [6], [11], [12]

∵ The great circulatory circle is 50 zhou per day.

∴ Each zhou = 1 day/50=1440 minutes/50 zhou=28.8 minutes/ zhou

Because qi and blood flow around 24 meridians per zhou, the average time they flow around the 1 meridian is 28.8/24 = 1.2 minutes = 72 seconds (constant)

∵ The relationship between the heart rate and rate of breathing is 4:1.

∴ The average number of human heartbeats is 27,000 × 4 = 108,000 times per day.

If the average time of every heartbeat is S, 1 day=108,000S

∴ S=1/108,000 day
   =1,440×60/108,000 second/ one heartbeat
   =0.8 second/ one heartbeat [2]

As qi and blood flow through one meridian the heartbeats 90 times. The average number of human heartbeats is HR = 60/C5 = 75 times/minute. When the heartbeat and breathing of a newborn baby is independent, he is connected to the world. The meaning of time is connected to the heartbeats and breaths, and the time that each heartbeat one takes represents the origin of time in the universe. And, the basis of time of the meridian circulation is the average time of each heartbeat [2].

The average time, proposed by western medical science, for blood to circulate the body is equal to the average time for qi and blood flow through all meridians [2].

In the history of western medical science, William Harvey was the first to describe in detail the concept of blood circulation. He proposed this concept a hundred years ago, while the concept of qi-blood circulation in meridians was described in *Nei Jing* more than a thousand years ago. However, little is known about the relationship between the

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blood circulation in Western medical science and the qi-blood circulation in *Nei Jing*. The purpose of this study is to search for the relationship between the two concepts by comparing the circulation time for blood to travel to every blood vessel I the body and the circulation time for qi and blood to flow around all meridians.

The circulation time for blood to travel to every blood vessel in the body: Breathing and heartbeats drive blood circulation. From a physiology point of view, blood circulation time can be calculated by the total volume of blood in the circulatory system and the amount of the blood pumped once from the heart. The total volume of blood is 1/13 of the weight of the human body. Therefore, a typical adult whose weighs 65 kg has a blood volume of approximately 5 liters (5 kg). The average heart pumps out about 60 cc to 80 cc of blood per second. Thus, the circulation time for blood to travel once to all blood vessels in the body is (5000/80 + 5000/60) /2 = (62.5+83) /2 ≧ 72 seconds (A).

The average time for qi and blood flow around one meridian is 72 seconds: Breathing and heartbeats drive qi-blood circulation. The average person breathes 13,500 times per day, and 9.375 (13,500/1440 = 9.375) times per minute. The average number of heartbeats, therefore, is 75 beats per minute. Qi and blood take 28.8 minutes to travel around all meridians, and takes 72 seconds to flow through one meridian (28.8/24=1.2分 =72 seconds) (B)

∵ The qi and blood flow 6 cun for one breath with eight heartbeats, and each heartbeat takes 6.4 seconds. Besides, the average length for each meridian is 1,620 cun/24 meridians = 540N/24meridians = 45N/2

∴ The average time for the qi and blood to flow through one meridian is 6.4 seconds × (45N/2)/2N = 1.6×45 seconds = 72seconds (B)[2]

Since (A)=(B), we can conclude that the circulation time for blood to travel to all blood vessels in the body is the same as the circulation time for qi and blood to flow around the 12 meridians. The constants of the Four Fingers Theory [2] would be used as my research tool to prove that there are 66 acupoints under a human elbow and knee. [2]

II. RESEARCH QUESTIONS

According to the Four Fingers Theory as described earlier, this study examines the application of the Four Fingers Theory and serves as a method to prove there are 66 acupoints under a human's elbows and knees. The research question addressed is as follows: Whether Four Fingers Theory can prove the premise outlined in *Nei Jing* [3], [4], [6] that there are 66 acupoints under a human's elbow and knee.

III. FINDINGS

The study used the derived data above and the researcher's clinical and teaching experience to analyze the relationship between Four Fingers Theory and the 66 acupoints under a human's elbow and knee. Based on Four Fingers Theory, the name of each meridian is substituted by codes from Ho Tu Lo Shu. The corresponding codes are as follows:

TABLE I
THE CODES IN FOUR FINGERS THEORY

the Name of the Meridians	Code in Four Fingers Theory
Lung Meridian	4
Large Intestine Meridian	9
Heart Meridian	2
Small Intestine Meridian	7
Pericardium Meridian	11
Triple Burner Meridian	12
Spleen Meridian	5
Gall Bladder Meridian	8
Liver Meridian	3
Urinary bladder Meridian	6
Kidney Meridian	1
Stomach Meridian	10

A. Experiences of Acupuncture Teaching

Sun Simiao (581-682) proposed that "Frequent stimulation to Zusanli can help people preserve and maintain a good level of health". "Sanli", also known as three cun and the length of four fingerbreadth (1N), and is mainly located at the intervals of every four fingerbreadth above and below the joints. This area of the human body includes the smallest of the body's blood vessels, the capillary. These micro-vessels connect arterioles and venules(anastomosis), and they help to enable the exchange of water, oxygen, carbon dioxide, and many other nutrients and waste substances between the blood and the tissues surrounding them (Fig. 5). One well-known Chinese mnemonic (Fig. 4), which is used for facilitating the recall of acupoints for acupuncture practitioners, can prove this phenomenon [5]:

Lieque is the common point of the head and posterior neck. It is the acupoint in the meridian named the Lung Meridian (LM). Lieque is located at an area of the thumb, and is four fingerbreadths above the wrist. It is the third point of LM (4-3). [4], [8], [17], [19]

Hegu is the common point of the face and mouth. It is the acupoint in the meridian named the Large Intestine Meridian (LIM). Hegu is located at an area of the thumb and is four fingerbreadths above the wrist. It is the first point of LIM (9-1). [4], [8], [17], [19]

Neiguan is the common point for heart and chest problems. It is the acupoint in the meridian named the Pericardium Meridian (PM). Neiguan is located at an area between the middle finger and the ring finger, and is four fingerbreadths above the wrist. It is the third point of PM (11-3). [4], [8], [17], [19]

Weizhong is useful for all lumbar related issues. It is the acupoint in the meridian named the Urinary bladder Meridian (UBM). Weizhong is located at the calf and above the Achilles tendon. It is on the fourth four-fingerbreadth above the ankle and it is the sixth point of UBM (6-6). [4], [8], [17], [19]

Sanli is the common point for all issues relating to the stomach. Sanli includes Shousanli and Zusanli. Shousanli is the acupoint in the meridian named Large Intestine Meridian (LIM) while Zusanli is the acupoint in the meridian named Stomach Meridian (SM). Shousanli is located at an area above the thumb, and on the fourth four-fingerbreadth above the wrist. It is the fourth point of LIN (9-4). Zusanli is located at an

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intersection between the four fingerbreadths under the outside of the knee and the fifth four fingerbreadth above the middle toe. It is the fifth point of SM (10-5). [4], [8], [17], [19]

Sanyinjiao is the common point for gynecological disorder. Sanyinjiao is located above the big toe, and four fingerbreadths above the ankle. It is the meeting point of three meridians: Liver Meridian (3), Spleen Meridian (5), and Kidney Meridian (1). Thus, the code of Sanyingjiao in Four Fingers Theory is: 3-3, 5-3 and 1-3. [4], [8], [13], [15], [17], [19]

Ashixue: The acupuncturist usually does the acupuncture directly on the points where the patient feels numbness, aching, or swelling. Generally, these points are on the acupoints though their locations may change as a result of injury, malnutrition, deterioration, and improper use. The acupuncturist therefore may not locate the acupoints following Four Fingers Theory. These acupoints are known as Ashixue. [4], [8], [13], [15], [17], [19]
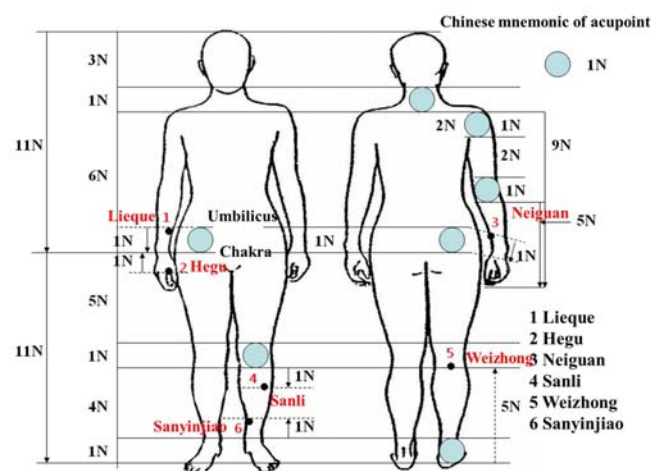

Fig. 4 Chinese mnemonics and acupoints

B. Experiences of Clinical Practices

The common acupoints in my clinical practices are as follows:

Waiguan: Waiguan is the acupoint in the meridian named Triple Burner Meridian (TBM). It is located at an area between the middle finger and the ring finger, and four fingerbreadths above the wrist. It is the third point of TBM (12-3). [4], [7]-[9], [13], [15], [17]

Zhongzhu: Zhongzhu is the acupoint in the meridian named Triple Burner Meridian (TBM). It is located at an area between the middle finger and the ring finger, and four fingerbreadths under the wrist. It is the first point of TBM (12-1). [4], [7]-[9], [13], [15], [17]

Yuji: Yuji is the acupoint in the meridian named Lung Meridian (LM). It is located at an area of the thumb and four fingerbreadths under the wrist. It is first point of LM (4-1). [4], [7]-[9], [13], [15], [17]

Shaofu: Shaofu is the acupoint in the meridian named Heart Meridian (HM). It is located at an area between the ring finger and the little finger, and four fingerbreadths under the wrist. It is the first point of HM (2-1). [4], [7]-[9], [13], [15], [17]

Houxi: Houxi is the acupoint in the meridian named Small Intestine Meridian (SIM). It is located between an area of the little finger and four fingerbreadths under the wrist. It is the first point of SIM (7-1). [4], [7]-[9], [13], [15], [17]

Yanglingquan: Yanglingquan is the acupoint in the meridian named Gall Bladder Meridian (GBM). It is located at an area between the fourth toe and the little toe, and four fingerbreadths under the outside of the knee. It is the fifth point of GBM (8-5). [4], [7]-[9]

Zulinqi: Zulinqi is the acupoint in the meridian named Gall Bladder Meridian (GBM). It is located at an area between the fourth toe and the little toe, and four fingerbreadths under the ankle. It is the first point of GBM (8-1). [4], [7]-[9]

Yinlingquan: Yinlingquan is the acupoint in the meridian named Spleen Meridian (SM). It is located at an area of the big toe, and four fingerbreadths under the inside of the knee. It is the fifth point of SM (5-5). [4], [7]-[9]

C. Derivational Process and Result

Thirty acupoints under the elbow: As we can see from Fig. 6, there are no microvessels connected to arterioles and venules on the fingers. Therefore, according to Four Fingers Theory, there are five four-fingerbreadths under the elbow, which means that there are five acupoints on each meridian. Since there are six meridians on each human arm, there are 5×6 = 30 acupoints under the elbow.

Thirty six acupoints under the knee: As we can see from Fig. 10, there are no microvessels connected to arterioles and venules on the toes. Therefore, according to the Four Fingers Theory, there are six four-fingerbreadths under human's knee, which means that there are six acupoints on each meridian. Since there are six meridians on the human leg, there are 6×6 = 36 acupoints under the knee.

It is concluded that there are 30 acupoints under the elbow and 36 acupoints under the knee. Thus, the total number of acupoints under the human elbow and knee is 66.
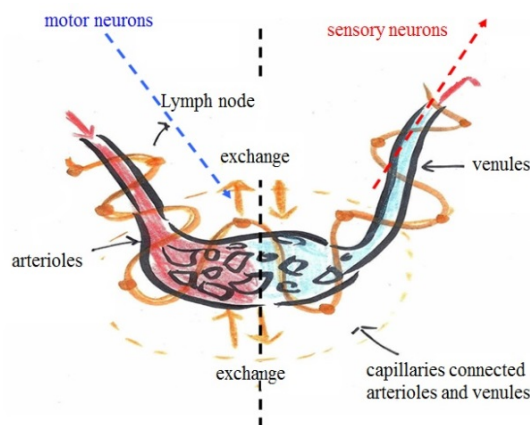

Fig. 5 An anatomy of acupoint and capillary network

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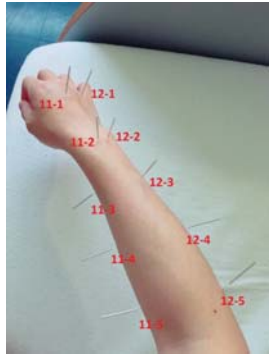Vol:10, No:9, 2016

Fig. 6 Acupoints of Pericardium Meridian (11) and Triple Burner Meridian (12) under the elbow
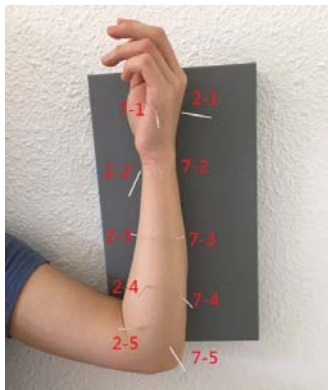

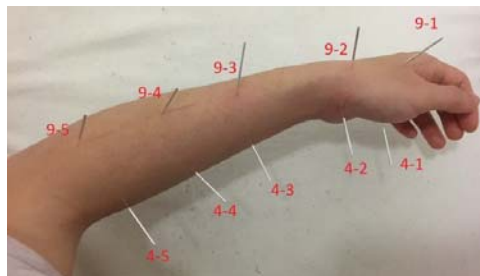Fig. 7 Acupoints of Small Intestine Meridian (7) and Heart Meridian (2)

Fig. 8 Acupoints of Lung Meridian (4) and Large Intestine Meridian (9)
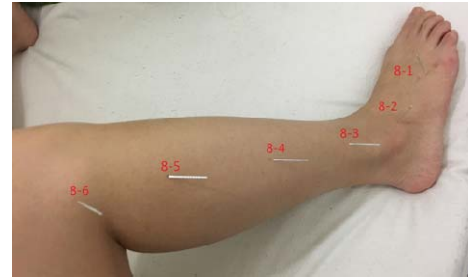

Fig. 9 Acupoints of Spleen Meridian (5)

Fig. 10 Acupoints of Gall Bladder Meridian (8)

Fig. 11 Acupoints of Liver Meridian (3)

Fig. 12 Acupoints of Urinary Bladder Meridian (6) and Kidney Meridian (1)

Fig. 13 Acupoints of Stomach Meridian (10)

IV. DISCUSSION AND CONCLUSION

This study, first, provided the origin of Four Fingers theory. And, building on the derived constants from the research background, it was found that there are 66 acupoints under the human elbow and knee. Besides, acupoint was an area in which capillaries connected arterioles and venules and help to enable the exchange of carbon dioxide, water, oxygen, and many other nutrients and removal of waste substances between the blood and the tissues surrounding them. There are no capillaries on

human fingers and toes, thus many points were not acupuncture points but nerve endings of the fingers and toes.

It is important to highlight that, in Fig. 13, the acupoint Zhongzhu was originaly located between the ring finger and the little fingers. Zhongzhu and Shaofu overlapped each other. It was corrected in this study (Fig. 14) since Zhongzhu should be located between the middle fingers and the ring fingers. In addition, the derived constants from the research background above and the Four Fingers Theory changed the acupuncture naming system to the number codes. [4], [7], [8]
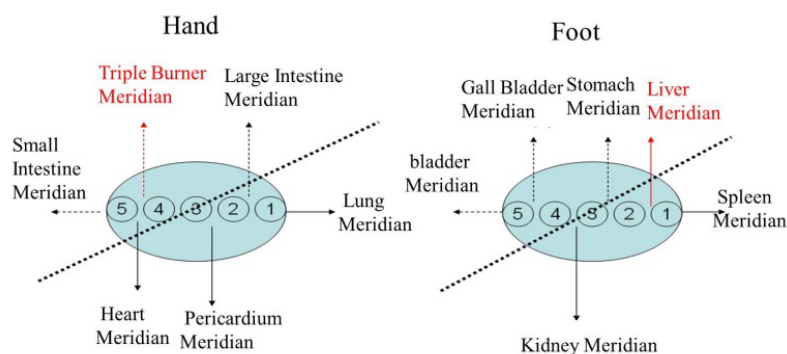

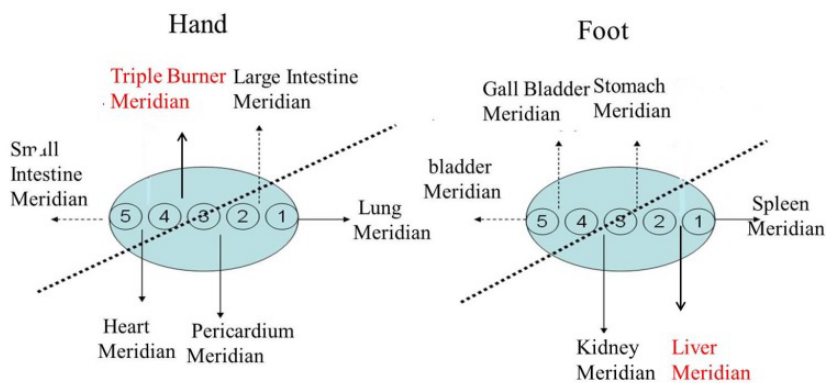Fig. 14 Originally Incorrect Distribution of the 12 Meridians

Fig. 15 Correct Distribution of the 12 Meridians

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