

The testing of classical pulse concepts in Chinese medicine: left right hand pulse strength discrepancy between gender and its clinical implications

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Abstract

The use of the radial pulse as a diagnostic tool is an important part of the Chinese medicine (CM) clinical evaluation. In spite of its long history of use, there is little systematic information available to support the many claims about the relationship between the pulse concepts contained in the classical Chinese texts and their manifestation in contemporary clinical practice.

This study reports the findings of an investigation into inter-arm pulse strength differences in subjects and the relationship to traditional pulse claims relating to gender. The pulses were assessed by two pulse assessors with a demonstrated high level of inter-rater agreement using a reliable means of measuring and recording pulse characteristics. This was achieved by reporting on the physical sensations that are detected under the fingertips that had been determined as relating to the concept of gender related left/right force/strength differences in the relevant available literature

Using a standardised pulse taking procedure and concrete operational definitions two pulse assessors each assessed the overall left and right pulse strength and rated their findings on a standardised pulse form. The overall percentage inter-rater agreement for manual assessment of dominant hand was 86% (based on a cohort of 66 subjects). A further breakdown of the findings indicated inter-rater agreement for 81% of male subject pulses and 89% of female subject pulses. In relation to the three possible choices regarding dominant side (right, neither, left) the right hand side was most commonly selected as relatively strongest of the two regardless of gender (60% of males and 71% of females). Analysis of the data using Chi square (II) found that the observed frequencies for an assessor's rating of dominant hand in males were significantly different to that as expected according to CM theory. Accordingly, the CM assumption of gender related differences in left and right hand pulses was not supported within this study.

Key Words

Radial pulse, gender differences, traditional Chinese medicine, TCM, pulse diagnosis, inter-rater reliability, diagnostic techniques

Introduction

For over two thousand years, in Europe, the Middle East and Orient there has been an interest in the relationship of the radial arterial pulses to an individual's health and response to disease. Early pioneers of pulse diagnosis include the Chinese physician Wang Shu-he (Jin Dynasty), Galen (129-195 AD) from ancient Greece and Susruta (5th Century BC) of the Ayurvedic traditions of India. Within the context of Chinese medicine (CM), the term 'pulse diagnosis' is used to refer primarily to palpation of the radial artery but also encompasses the Nine Continent Pulses, a seldom used technique involving palpation and comparison of various arterial pulses around the body. Interpretation of the pulse in terms of health depends on a complex system of qualities and theories that have developed over the past 1800 years and that link changes in arterial characteristics and blood flow to both health and pathology, taking into account circadian rhythms, an individual's environment and personal traits.

While not unique to CM, the pulse does take on special significance in CM diagnosis. It is used as an indicator of the functional activity for both cardiac and non-cardiac organ structures including functional relationships between organ groupings. The underlying assumption of pulse diagnosis is the ability of the pulse to reflect and change with the relative state of health of the body. For example, if the liver were inflamed or the spleen hypo functioning, the subsequent changes in the haemodynamics of the arterial system would be reflected in the arterial pulses. That is, the pulse is viewed as a reflection of function rather than an indication of the physiological integrity of an organ entity. Other intrinsic claims associated with CM pulse diagnosis concern its value as an indicator of the integrity of the immune system and for prognosis. Veith highlights the emphasis traditionally placed upon pulse diagnosis in that *all other methods of determining disease are only subsidiary to palpation and used mainly in connection with it* (p. 42). For this reason pulse diagnosis is often described as the most important of the CM diagnostic processes (Kaptchuk, 2000).

In spite of the historical importance and continued reiteration of its crucial role in the diagnostic process in many contemporary CM texts, many of the underlying assumptions and concepts that underpin pulse as a clinically useful technique have not been clinically substantiated. The paucity of evidence means that long held and untested assumptions are taken as clinical fact even though no independent evidence has been gathered to either support or refute their validity within the actual pulse physiology.

One such assumption is the gender based difference in palpable strength between the left and right radial pulses. The pulse is said to be stronger on the left hand side for males relative to their right, and for females, stronger on the right hand side relative to their left. Also, the *Chi* position should be stronger in women and the *Cun* position stronger in men relative to the other respective pulse positions (Maciocia, 1989). Clinically, a normal left /right imbalance in the pulse strength for a female would be deemed pathological if presenting in a male and therefore require treatment to rectify this imbalance. If pathology is not present then it is viewed as a prognostic sign of disharmony and impending poor health (Rogers, 1997).

In an examination of both classical and contemporary CM texts, there is a changing emphasis on the importance of gender influence on pulse. For example, the *Nan Ching* (Classic of Difficult Issues, 2nd century CE) states that male pulses are stronger above the ‘gate’, that is the *Cun* position relative to the *Chi* position, and for females, the pulse is relatively stronger below the ‘gate’, that is, the *Chi* position (19th difficult issue - p. 44-45, Flaws, 1999; p. 259, Unschuld, 1986). The *Mai Jing* (Pulse Classic), has two references to pulse strength regarding gender, both reiterate that the left side should be stronger in males and the right side in females relative to the other side. In another classical TCM text, the *Bin Hu Mai Xue* (*Lakeside Master’s Study of the Pulse*), the gender related strength difference is reaffirmed in which it states that *left large is auspicious (or normal) for a man. Right large is auspicious for a woman* (p. 9, Li, 1998). In Huynh’s (1981) translation of the *Bin Hu Mai Xue*, an explanatory note is provided for the justification of a gender related strength difference between sides.

‘The left is yang and the right is yin. Men have more yang qi. So, provided their qi is well regulated, their left hand pulse is stronger. Women have more yin blood. So, provided their qi is well regulated, their right hand pulse is stronger’ (p. 4).

However, in some contemporary CM texts, gender specificity in relation to pulse strength differences between right and left sides appears to be largely abandoned, with most referring to overall differences in strength between genders. For example, *in adult females, the pulse is usually softer and weaker than the male* (p. 37, Lu, 1996); *Women’s pulse are slightly softer and slightly quicker than men’s* (p. 28 O’Connor and Bensky, 1981). On the other hand, contemporary CM texts in the West tend to reiterate both the ‘contemporary Chinese view’ as well as traditional theory regarding gender based left/right differences. For example, Hammer (2001) quoting his own experience states that *the pulse is normally somewhat stronger on the*

right side in women, and on the left side in men (p. 95). Rogers states that *the pulses of a women should be a little stronger on the right wrist, while those of a man should be stronger on the left* (p. 88, 2000). Maciocia (p. 166, 1989) similarly notes a gender related left/right strength discrepancy. While not in reference to any specific difference in pulse force, interestingly, Morant (1994) refers to the left as representing '*blood/husband*' and the right '*nervous energy/wife*' (p. 300). In their examination of the use of the pulse across cultures, Amber and Babey–Brooke (1966) noted that *the left side is positive and the right side is negative in the male; the right side positive and the left side negative in the female* (p.148). In the absence of further clarification, it is assumed that this refers to comparative strength or force.

In some pulse assumption systems, a left/right strength discrepancy is related to the relative balance between *Qi* and Blood: the left side pulse relates to blood and the right side pulse to *Qi*, regardless of gender (**reference**). Applying this concept to a subject's gender, if men are relatively stronger on the left, then logic dictates that they are constantly *Qi* vacuous. For women, this would manifest as a constant state of Blood vacuity. However, if the pulse situation was reversed, then each genders respective pulse would reflect disharmony and impending poor health according to classical gender specific concepts of inter-arm strength differences. Treatment principles for this situation would suggest that the practitioner try and rebalance the pulses to promote optimal health. The practitioner would endeavour then to have the left pulse be stronger for men and the right stronger for women. Acupuncture points such as Kd 27 (*Shufu*), located between the clavicle and first rib lateral to the sternum, are indicated for use in such situations (Rogers and Rogers, 2000). (**Japanese reference/info?**)

Despite a lack of consensus by the literature and evidence regarding the clinical validity of the left/right gender related difference in pulse strength, the concept continues to be taught as clinical fact within educational facilities. It is obvious that this has implications both clinically, in terms of correct diagnosis and appropriate treatment, and for educators in teaching pulse diagnosis to students. For this reason, a study was proposed to investigate the clinical evidence relating to support of this theoretical assumption.

Study aims and objectives

Of particular importance for this study was the determination of a relative difference in pulse force within and between subject's left and right arms by gender. As such, the aims of this study were to assess whether there *is* a palpable difference in force between the left and right arms and

whether gender is an important determinate in the manifestation of any left/right strength discrepancy.

In order to begin any research-based assessment of pulse there needs to be a reasonable level of between-practitioner reliability. Reliability, in the context of pulse diagnosis, is viewed as the accessibility of pulse palpation as a practice to be consistently used by practitioners to identify changes in pulse characteristics and to relate these to pathology through a consistent means of interpretation. Reliability is, in effect, a product of the literature, theories and systematic use of pulse diagnosis in practice. Stern and Kalof (1996) wrote:

In short, for observations to have scientific value, there must be assurance that different observers of the same people or events would use the abstractions in the same way. The technical term for this is reliability (p. 12).

For this study, inter-rater reliability refers to the ability of two or more practitioners to independently assess subjectively measured pulse variables and obtain consistent agreement. For this reason, two practitioners with a demonstrated high level of inter-rater percentage agreement for pulse assessment of the CM pulse parameter of pulse force, were used as pulse assessors in the study (King *et al*, 2002).

Pulse diagnosis, in its traditional form, customarily discusses pulse in terms of specific pulse qualities. There are approximately 28 traditional pulse types used in CM, depending upon the text consulted. These terms are inherently subjective in nature due to the wide-ranging names and ambiguous descriptions used by different authors to interpret each type. For this reason, the assessors used the parameter method of pulse assessment that has been demonstrated as being reliable by two independent pulses assessors (King *et al*, 2002). The parameter method uses unambiguous concrete pulse descriptions for interpreting the pulse sensations as palpated under the fingers. A parameter is a single dimensional unit of 'measurement' or a simple aspect of a pulse presentation such as pulse rate or pulse length. Each are described and evaluated using operational definitions and standardised terminology with a reliable measurement system. (For a comprehensive list of pulse parameter operational definitions and accompanying pulse collection form see King *et al*, 2002).

In regards to the gender related left/right pulse force discrepancy, this is expressed in the literature in terms of pulse strength or force, terms that are often used interchangeably. For the purposes of this study, 'force' is used to refer to the overall intensity of the arterial pulsation as it strikes the finger and 'relative force' is used to denote the comparative difference in overall force between the left and right radial pulses. Assessment of overall pulse force and relative force by the pulse assessors required evaluation of a number of parameters, including the intensity with which the arterial pulsations strike the fingers, the arterial width and ease at which the pulse could be occluded. The term relative force was used for comparative differences between sides and required measurement of the pulse at three levels of depth to determine the level at which the pulsations were greatest overall.

From a biomedical perspective, the force of pulsation or cardiac contraction is the pressure wave difference within the radial artery as it passes underneath the fingers in respect to time (p. 19, O'Rourke *et al*, 1992). For example, a cardiac contraction which has a large proportion of the beat taken up by systole will have a slow increase in pressure in the artery. This is perceived as a pulse lacking force. Alternatively, a heart beat which has a large proportion of the beat taken up by diastole indicates a quick cardiac contraction resulting in a quick rise in arterial pulse pressure. This is perceived as a pulse with force using manual palpation (Walsh, 2003). A heart beat is defined as a period of heart rate that includes a period of systole or cardiac contraction and diastole or cardiac relaxation (p. 594, Tortora and Grabowski, 1996).

Subjects

Informed consent was obtained from 66 healthy subjects (27 men and 39 women), who were voluntarily recruited from the staff and student population at UTS and from the general population. Approval for the study was obtained from the UTS Human Research Ethics Committee. Consent was also obtained from the UTS College of Traditional Chinese Medicine for use of their clinical facilities for data collection.

Data collection occurred in two stages. For stage one, two pulse assessors independently located and marked the three arterial pulse sites and assessed overall force of the pulse for both the left and right arms. This was followed by a second stage in which demographic information was collected from each subject and brachial blood pressure measurements taken.

Stage 1

The three traditional pulse positions used for pulse assessment were located and marked to ensure repeated readings were taken from the same sites for manual data collection. To do this, the three pulse sites for measurement were located using the styloid process of the radius. These positions were termed *Cun*, *Guan* and *Chi*. The *Guan* or middle position was located directly medial to the styloid process on top of the radial artery. The middle finger of the assessor was placed on the *Guan* position, with the index and ring fingers falling naturally into place either side of the middle finger (*Cun* and *Chi* positions respectively). This placed the *Cun* position proximal to the wrist flexure and the *Chi* position proximal to *Guan*. Assessment of overall force for each hand required palpation of the pulse at three levels of depth; superficial, middle and deep.

The superficial level of the pulse was identified by placing the fingers lightly, without pressure, on the skin overlying the radial artery. The deep level was palpated next by applying enough pressure on the radial artery to occlude it, then gently releasing the pressure until the pulse could once again be felt. The pulse was then allowed to equalise. The middle level was found last, midway between the two previous levels. When making an assessment of relative force between arms, the subject was asked for feedback on the applied finger pressure to determine if the assessor was simultaneously applying an equal pressure at both the left and right arms at a particular level of depth. If necessary, finger pressure was adjusted. Findings were noted on a standardised pulse recording form (King, 2001).

Stage 2

Demographic information was collected on a standardised form for each patient. Information gathered included age, weight, height, activity regimen, caffeine intake, medication, smoking, left or right handedness, heart rate, current health status and blood pressure.

Blood pressure was recorded for both the left and right arms using a brachial cuff sphygmomanometer (Omron M4 Automatic Digital Blood Pressure Monitor, Minato-ku, Japan). Sequential readings were taken with a second Omron M4 blood pressure machine. The average of two readings for each respective arm was calculated and recorded. Patients were seated with the arm placed in a supported horizontal position level with the sternum.

Procedure

Data collection was conducted in morning and afternoons sessions using a treatment room in the UTS Acupuncture Clinic. Data were collected in 20 minute sessions with subjects seated at a padded treatment table opposite the pulse assessors. Subjects were requested to remain in a comfortable but upright position with their legs uncrossed to prevent any possible postural variation in the pulse. The subject's arms were positioned level with the subject's heart and hands were positioned with palms face up. Subjects were requested to refrain from speaking during data collection. The *Cun*, *Guan* and *Chi* pulse positions were then located and marked. This was followed by manual pulse assessment by the two independent assessors.

The assessor's right hand was used to assess the subject's left pulse and the assessor's left hand was used to assess the subject's right pulse. Each researcher in turn simultaneously palpated both radial arteries at all depths, recording their assessment of the pulse in respect to the dominant left/right balance. A bias in the 'handedness' and sensitivity within the practitioners was controlled by the inclusion of one practitioner who was right hand dominant; while the other pulse assessor was left hand dominant. When completed, demographic information from the subject and measurement of brachial arterial blood pressure for each arm were obtained.

Data Analysis

Analysis of the observed left/right strength for each subject by the assessors were undertaken to determine if the observed findings differed significantly from that predicted by CM theory. For this, data were analysed using Chi-square (χ^2) with the level of significance set at the standard value $\alpha = 0.05$.

Results

Demographics

Table 1 shows the demographics for males and females. There was no significant difference in age and heart rate between the two groups. There was a significant difference in the height, weight, and systolic and diastolic pressure for both the left and right arms. There was no significant difference between the two groups regarding handedness.

The primary aim of this study was to observe if there is an inter-arm difference in pulse strength based on a subject's gender. Reliable manual palpation was dependent upon the strength of the

inter-rater agreement between the two pulse assessors. The overall percentage inter-rater agreement for manual assessment of dominant hand was 86% (or 57 out of the 65 subjects).

Further breakdown of the data sets with inter-rater agreement showed that 22/27 related to the male subjects and 34/38 to female subjects. As such, there was 81% inter-rater agreement for male subjects and 89% inter-rater agreement for female subjects. Of the three possible choices regarding dominant side (right, left or neither dominant) the right hand side was most commonly selected as dominant regardless of gender (M = 60%, F = 71%).

According to CM theory, it was expected that the left hand side should be stronger in male subjects than the right and vice versa in females. Analysis of the data using chi square (II) found that there was no significant difference in the selection of dominant hand strength between females and males ($\chi^2_{2(II)} 0.9, p=0.6$). Analysis of the data using **chi square (I)?** found that the observed frequencies for dominant hand in males were significantly different to that expected according to CM theory ($\chi^2_{2} 180, p=0.0001$) **how did we figure this out? Because this is a chi square II!!**

Discussion

The gender related differences in pulse according to gender are described in CM texts with vague terms such as ‘stronger’ or ‘large’ or described overall as being forceful or stronger than the other side pulse (p. 95, Hammer, 2001; p. 450, Maciocia, 2004). However, no description in the available relevant literature endeavours to specify exactly what they mean by these terms. That is, they are ambiguous and open to interpretation. For the current study, these terms, after a comprehensive review of the literature, have been interpreted as relating to relative differences in the overall intensity or impetus of the arterial pulsation striking the fingertip when the pulse was palpated, as defined by King *et al*, 2002. It was measured using two criteria: the amplitude of the pulse pressure wave with respect to time, and the area of the artery coming in contact with the receptors of the fingertips.

Using these definitions (as discussed in methods), it was found that the pulse was most likely found by the assessors to be strongest on the right side, irrespective of a subject’s gender. There are two explanations for this result. The first, that the definition used by the assessors was not what is meant by the term used in describing the relative difference in pulse force between sides in the literature. That is, differences in gender left/ right strength discrepancy may be due to other

qualitative differences as opposed to solely differences in pulse force. However, if this is so, it is not clearly stated in the literature. This is compounded by the fact that when left/right gender related differences in pulse are stated there isn't any consistency between sources. Finally, there are a range of descriptive terms applied to the term 'force' creating confusion. For example, force may also relate to pulse width, arterial diameter and/or arterial tension; and if it is, it is not clearly explored or expanded upon in the literature. Furthermore, while the authors used a method of pulse assessment that has been shown to be reliable, this also may have differed from the original method to assessing comparative strength differences between arms. The study certainly reinforces the need for unambiguous definitions.

The second explanation is that the application of the concept of force to relative strength differences used in the study was appropriate and accordingly that the results do not support the CM assumption that female pulses are stronger on the right and male pulses are stronger on the left. Rather, left and right strength discrepancies do occur between an individual's left and right pulses but these were not dependent upon gender.

There was a trend of stronger right side pulse force in the study cohort as assessed by manual palpation. A possible explanation for this was the predominance of right hand dominant subjects in the cohort. That is, out of 65 subjects 94% were right handed. Singer and Hollander (1996) puts this down to a greater muscle mass of the dominant forearm not being easily compressed by a brachial measurement cuff, and therefore a stronger pulse. If this were the case, then a larger sample size of left handed subjects may shed light on this matter. However in the reviewed CM literature handedness dominance is not mentioned in relation to left/right gender related differences.

The study cohort, irrespective of gender, had a larger right systolic pressure and pulse amplitude difference compared to the left arm. Inter-arm differences in pulse pressure have previously been reported in the literature. For example, Singer and Hollander (1996) reported that 53% of a group of non-cardiac patients (N = 610) had a pressure difference of more than 10 mm Hg between arms and 19% had a systolic or diastolic inter-arm blood pressure difference of more than 20 mm Hg. The variation was unrelated to gender and was not dependent upon age, height or blood pressure. Other studies that have investigated this phenomenon have shown no differences or minimal difference between arms. For example, Gould and Hornung *et al* (1985) found a mean

inter-arm blood pressure difference of only 1.3 mm Hg, and, in another study, failed to show any significant inter-arm difference (Gould and Kieso *et al*, 1985).

With regards to gender related pulse differences, a study by Asmar *et al* (1997) reported the identification of gender difference in radial systolic blood pressure with higher measurements being recorded for men. The reported relationship was made solely on BP measurement rather than manual pulse assessment as used in CM. Hayward and Kelly (1997) also noted gender differences in the aortic pulse waveforms in recordings of the central arterial pressure waveform using applanation tonometry. The results of the study supported these findings with men recording an overall greater mean blood pressure than women subjects. This was seen in both the left and right arm blood pressure readings for both systolic and diastolic blood pressure. However, these findings only relate to overall differences in pulse variables between gender rather than gender specific inter-arm differences as 'predicted' or assumed by Chinese medicine pulse theory.

Accordingly, it is unknown whether the study findings with right arm pressure dominance can be extrapolated or attributed to the manual pulse variable 'pulse strength' or blood pressure. However, it can be hypothesised that because of the larger difference between the base and maximum blood pressure in the right artery, that any palpatory assessment of the pulse would perceive the pulse as relatively 'stronger' for that side as the pressure differences were large. According to Adler (1979), the perceived force of a pulse is due to the divergence of the systolic and diastolic blood pressures. As such, the subsequent pressure wave transmission, augmentation and arterial compliance would all influence pulse formation and strength as palpated at the radial arterial pulse.

The left/right imbalance in pulse has its roots in *Yin Yang* theory which considered the left side of the body to be *Yang* and the right side *Yin*. As males are considered to be more *Yang* in nature, then their right side pulse should be stronger and vice versa for females. From the study results it appears that this concept may have only ever had an intellectual validity to conform to the inherent *Yin Yang* natures of women and men to *Yin Yang* theory; there is no actual practical application or clinical validity of the concept in clinical presentation. The divergence of actual presentation of pulses in the population as opposed to theoretical concepts, as demonstrated in this study, simply strengthens the need for demographic investigations. That is, at present it is unknown what constitutes a 'normal' pulse unless studies are undertaken to identify this. Any

demographic investigations would help validate pulse as a diagnostic indicator. Obviously, what is presented in century old clinical texts may no longer be valid within contemporary practice, if it ever was.

Conclusion

From the study findings, for the cohort of subjects whose pulses were assessed using the standardised terminology and operational definitions of pulse force, the CM concept of gender related left/right pulse strength discrepancy was not supported. While not indicated within the CM theory as being a factor in left/right strength differences, a study involving a larger cohort of left hand dominant subjects would be warranted to help elucidate upon some of the study findings. The findings of the study have clinical implication for the diagnostic importance, or lack of, of any left/right pulse difference that is discerned by a practitioner. Rather than using traditional concepts of gender and *Yin Yang* theory, rather any perceived difference could be better interpreted using *Qi/Blood* balance instead. While the study was undertaken using the available relevant literature and the description of left/right gender related differences as relating to pulse force however, a difference could be due to other parameters and qualitative factors such as depth, or arterial tension. Irrespective of this, this highlights the poor quality of definitions and poor consensus between sources that is prevalent within the available relevant literature on pulse diagnosis.

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Tables

	Male	Female	Significance
No. of subjects	27	39	
Age	28.36 (18- 46)	27.40 (19- 51)	0.66
Height (cm)	177.52 (164 - 188)	164.75 (152- 180)	0.0001
Weight (kg)	73.04 (49 - 117)	58.09 (43- 85)	0.0001
Left Systolic BP (mm Hg)	115.4 ± 11.9	97.9 ± 8.6	0.0001
Left Diastolic BP (mm Hg)	69.7 ± 7.1	63.43 ± 4.9	0.0001
Right Systolic BP (mm Hg)	118.8 ± 13.4	100.3 ± 8.9	0.0001
Right Diastolic BP (mm Hg)	68.2 ± 8.4	62.37 ± 5.41	0.0012
Pulse Amplitude (SP – DP)			
Heart rate (bpm)	68.4 ± 10.3	71.6 ± 9.7	0.2
Smokers	6	3	
Left handed	1	2	
Right handed	25	36	
Ambidextrous	1	1	

Table 1: Baseline Demographics

	Mean	Range	SD	SE
Age	26.7	19-44	6.6	0.4
Weight (kg)	59.7	43-80	7.4	0.5
Height (cm)	164.0	152-178	6.1	0.4
R Systolic (mmHg)	103.2	85-142	10.6	0.9
R Diastolic (mmHg)	65.1	52-84	7.0	0.6
L Systolic (mmHg)	100.7	86-130	9.9	0.9
L Diastolic (mmHg)	65.4	54-80	6.7	0.6
Heart rate (pbm)				
Pulse amplitude (SP-DP)				
Smokers	2			
Right handed	39			
Left handed	2			
Ambidextrous	2			

Table 7.1: Subject demographics and clinical parameters are shown for female subjects (N = 43) with the mean, range, standard deviation (SD) and standard error (SE). ‘use this table format????’

Dominant hand agreement	Frequency agreement	Percentage agreement
Yes	57	86 %
No	8	14 %
Total no. of subjects	65	

Table 2: Inter-rater agreement for dominant hand.

	Assessor 1	Assessor 2	Agreement	Percentage of inter-rater agreement
<i>Males</i>				
Right dominant	17	13	13	48%
Left dominant	4	6	3	11%
Neither dominant	6	8	6	22%
Total	27	27	22	81%
<i>Females</i>				
Right dominant	26	25	24	63%
Left dominant	6	6	4	11%
Neither dominant	6	7	6	15%
Total	38	38	34	89%

Table 3: Breakdown of inter-rater agreement for dominant hand according to gender.