

# Can the Ileocecal Valve Point Predict Low Back Pain Using Manual Muscle Testing?

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**ABSTRACT:** *Background:* According to some technique groups in chiropractic the ileocecal valve may malfunction and be associated with a large array of health problems that can lead to common chronic health issues prevalent in our society. Many tests commonly used in chiropractic are presumed to identify painful and/or dysfunctional anatomical structures, yet many have undemonstrated reliability. Despite this lack of evidence, they form the basis of many clinical decisions. One cornerstone procedure that is frequently used by chiropractors involves the use of manual muscle testing for diagnostic purposes not considered orthopaedic in nature. A point of the body referred to as the ileocecal valve point is said to indicate the presence of low back pain. This procedure is widely used in Applied Kinesiology (AK) and Neuro-Emotional Technique (NET) chiropractic practice. *Objective:* To determine if correlation of tenderness of the "ileocecal valve point" can predict low back pain in sufferers with and without low back pain. It was the further aim to determine the sensitivity and specificity of the procedure. *Methods:* One hundred (100) subjects with and without low back pain were recruited. Subjects first completed information about their pain status, then the practitioner performed the muscle testing procedure in a separate room. The practitioner provided either a *yes* or *no* response to a research assistant as to whether he had determined if the subject had back pain based on the muscle test procedure. *Results:* Of 67 subjects who reported low back pain, 58 (86.6%) reported a positive test of both low back pain and ICV point test. Of 33 subjects, 32 (97.0%) with no back pain positively reported no response to ICV point test. Nine (9) subjects (13.4%) reported false negative ICV tests and low back pain, and 1 subject (3%) reported a false positive response for ICV test and no low back pain. *Conclusion:* The majority of subjects with low back pain reported positive ileocecal valve testing, and all but one of the subjects without low back pain reported negative ileocecal valve testing. The application of ileocecal valve testing as a diagnostic measure of low back pain was found to have excellent measures of sensitivity, specificity and diagnostic competency. This study confirms that the use of this test within the limitations of this study is reliably associated with the presence of low back pain. Further testing is required to investigate all aspects of the diagnostic milieu commonly used by proponents of this form of diagnostic testing.

INDEX TERMS: (MeSH): CHIROPRACTIC; ILEOCECAL VALVE.  
(Other): APPLIED KINESIOLOGY; NEURO-EMOTIONAL TECHNIQUE; MANUAL MUSCLE TEST.

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## INTRODUCTION

From an anatomical perspective, the ileocecal valve (ICV) is a valve connecting the terminal ileum, the final segment of the small bowel, with the caecum, the first part of the large intestine. This is the site where chyme passes from the ileum to the colon, and the ileocecal valve functions to prevent materials in the large intestine from regurgitating into the small intestine. Anatomists and physiologists once thought the bicuspid nature of the valve worked as a one-way valve. More recent investigations have revealed a much more complex

function under neuronal and hormonal control,<sup>2,3</sup> which includes pressure response, nerve control, secretion control and roughage maintenance.<sup>4</sup> ICV malfunction, or ileocecal valve syndrome, according to the chiropractic techniques of Applied Kinesiology (AK) and Neuro-Emotional technique (NET), can be associated with a large array of health problems. These problems include low back and neck pain, anxiety, headache, nausea and intestinal toxicity,<sup>5</sup> which may cause dysfunction that can lead to incontinence, irritable bowel syndrome, chronic fatigue syndrome, ulcerative colitis and Crohn's disease, and they can be associated with common chronic health issues prevalent in our society.

Diagnostic tests are presumed to identify painful and/or dysfunctional anatomical structures. When diagnostic tests are used to examine patients, the degree to which such tests are useful is not always known. Many of the non-orthopaedic tests used by chiropractors have undemonstrated reliability, yet they form the basis of many clinical decisions. Practitioners of AK have suggested that the diagnosis of subjects with low back pain can be reliably predicted by "muscle testing" a point referred to as the ICV point.<sup>5</sup> Others, such as Walker,<sup>6</sup> agree. The ICV point is located at the junction of the ileum and caecum. In the protocol described by Walker,<sup>6</sup> the subject is first muscle tested and then has the ICV point lightly

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stimulated with digital pressure, followed by a repeat of the muscle test. The subjective response (a change in muscle strength measured by manual muscle testing) following the stimulation is then said to be predictive of whether lower back pain is present; however, the degree to which this point can reliably predict low back pain has not been tested. This study applied the ICV test to a cohort of subjects with and without low back pain.

The aim of this study was to investigate the reliability of ICV muscle testing for low back pain, and to determine if correlation of tenderness of the ICV point can predict low back pain in sufferers with and without low back pain. We investigated this aim by testing the null hypothesis that the ileocecal valve point will not be able to predict lower back pain in a cohort of subjects unknown to the tester. It was the further aim to determine the sensitivity and specificity of the procedure.

## METHODS

### Experimental Procedure

This study received Macquarie University Human Ethics Committee approval to proceed prior to any experimentation. Participants completed written informed consent before the experimental session and after the procedure had been completely explained to them. Their participation was entirely voluntary.

Following the approval, subjects were recruited from local print media advertising calling for volunteers to participate in a study on assessing lower back pain. Subjects with and without lower back pain were recruited. After providing consent, subjects completed a questionnaire that was administered by an assistant not involved in the muscle testing procedure. Subjects first completed information about their pain status; they were excluded if they had previous contact with the assessor. Following the completion of the questionnaire, subjects were then taken into a separate room for testing. All subjects were instructed not to say anything to the assessing practitioner whilst participating in the study. The project included 100 volunteer participants, of whom 79 were female and 21 were male. The age range of participants was between 20 and 74 years, with a mean age of 37 years.

The practitioner was informed that no verbal interaction could be undertaken with the subject, nor could any other form of testing. Only a single muscle procedure by the practitioner was permitted. The subject was taken into the testing room, and once there the practitioner followed and performed the muscle testing procedure. The practitioner was to provide either a *yes* or *no* response to a research assistant as to whether he had determined the subject had back pain based on the muscle test procedure. The research assistant recorded the response.

### Description of Muscle Test Procedures

The assessor used the deltoid muscle strength test to determine the response to stimulating the ICV point. The participant sat facing the tester; the tester stood directly in front of the subject. The arm was outstretched in front of the subject at right angles to the body, with the hand kept in a loose fist, the elbow straight, and the forearm pronated with the hand parallel to the floor. In the manual muscle test,

the tester placed a hand at a location approximately 5 cm proximal to the ulnar styloid in the midline of the forearm. The participant was asked to hold that position against pressure exerted by the tester's hand that was applied in a superior-to-inferior direction. The right limb was requested in all cases unless there was an existing injury to that side. The assessor was blinded to status of low back pain in the subject.

### Analysis

Statistical analysis of the data was made using a 2 x 2 contingency table analysis to determine the sensitivity and specificity of the testing procedure. The statistical interpretation was similar to a correlation coefficient (*i.e.* the highest level of agreement is 1.0, whereas the lowest level is 0). Dawson and Trapp<sup>7</sup> have outlined a scale for qualifying the quality of agreement between examiners. They suggest an  $\kappa$  score of 0.93 to 1.0 as an excellent agreement, 0.81 to 0.92 as a very good agreement, 0.61 to 0.80 as a good agreement, 0.41 to 0.60 as a fair agreement, 0.21 to 0.40 as a slight agreement, and 0.00 to 0.20 as a poor agreement.

## RESULTS

### Description of Subjects

One hundred (100) cases were included in the analysis; 79 (79%) were female, and 21% were male. Ages ranged from 20 to 74 years ( $36.9 \pm 11.02$ ). Sixty-seven (67%) self-reported with low back pain with 33 (33%) reporting no low back pain.

### Positive Tests

The prevalence of low back pain compared with the number of reported true-positive and true-negative ICV tests of low back pain can be seen in Table 1. Of 67 subjects who reported low back pain, 58 (86.6%) reported positive tests of both low back pain and ICV point test. Thirty-two (32) of 33 subjects (97.0%) with no back pain positively reported no response to ICV point test. Nine subjects (13.4%) reported false negative ICV tests and low back pain, and one subject (3%) reported a false positive response for ICV test and no low back pain.

### Contingency Table Analysis

Results for the contingency table analysis can be seen in Table 2. Sensitivity (0.86), specificity (0.97), Youden's Index of combined diagnostic competency (0.84), likelihood ratio for positive test result (28.6), likelihood ratio for negative test result (0.14), positive predictive value (0.98), negative predictive value (0.78) and the Kappa value (0.79) are shown.

## DISCUSSION

It is thought that ileocecal valve syndrome symptoms manifest as a result of the absorption of toxic products by the ileum that have been regurgitated from the colon. Ileocecal valve syndrome is frequently involved with psoas muscle dysfunction, quadratus lumborum imbalance and tenderness of the spinal column.<sup>5</sup> Applied kinesiologists suggest that structural imbalance at the quadratus lumborum may exaggerate pain at the level of the 12<sup>th</sup> thoracic vertebra, causing upper and lower thoracic pain, whilst tenderness of the spinal column is found in the areas of the inferior tip of the vertebral spinous processes.<sup>8</sup>

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Table 1

LOW BACK PAIN vs ICV TEST FOR LOW BACK PAIN				
		Low Back Pain		Total
		Yes	No	
ICV Point	Yes	(a)	(b)	(a+b)
		58	1	59
	No	(c)	(d)	(c+d)
		9	32	41
Total		(a+c)	(b+d)	
		67	33	100

True positive = 86.6%; true negative = 97.0%; false positive = 3%; false negative = 13.4%; 95% CI; P <.0001.

Table 2

CONTINGENCY TABLE ANALYSIS OF THE ICV TEST FOR LOW BACK PAIN		
		Value
Sensitivity	a/(a+c)	0.86
Specificity	d/(b+d)	0.97
Likelihood ratio for positive test result	sens/(1-spec)	28.6
Likelihood for negative test result	(1-sens)/spec	0.14
Positive predictive value	a/(a+b)	0.98
Negative predictive value	d/(c+d)	0.78
Youden's Index	sens + spec - 1	0.84
Kappa		0.79

95% CI; P <.0001

The ileocecal valve point is a diagnostic point that is used to indicate low back pain in some technique groups within chiropractic. The presence of a change in the muscle test after the point is stimulated is said to be indicative of the presence of back pain. Previous studies have demonstrated reliability of the muscle test for the mechanical performance of muscle testing from both the intra-examiner<sup>9</sup> and inter-examiner perspective.<sup>10</sup> Despite the orthopaedic use of this test, its use in a diagnostic sense has not been widely investigated. This test is usually used as a part of a multi-tested protocol to determine diagnosis.<sup>11</sup> This investigation attempted to determine the predictive value of the one part of this diagnostic protocol in assessing low back pain. No causation is implied in this result, only association. It is important to note that no value can be attributed to the other components of the diagnostic protocol used or the treatments that are rendered after they are determined. These tests and treatments must all be investigated separately to determine their worth in diagnostic and management protocols.

It is difficult to ascertain that one single test can be expected to be positive in all or most cases of low back pain, due to the multifactorial nature of low back pain. The

exact interpretation of most orthopaedic tests is therefore uncertain, with previous studies supporting this assertion.<sup>12,13</sup> Trying to determine the value of diagnostic testing used in spine assessment is near impossible, as there is no completely reliable gold standard with which to compare. This study encompassed the occurrence of self-reported low back pain as a reference, or gold standard diagnosis. Furthermore, the absence of low back pain combined with the reporting by subjects as having no back pain was also assessed as a reference gold standard measure for comparison with the results of ICV testing. Therefore, ultimately, subjects underwent *both* the diagnostic test and the reference point. Notably, this does assume the self-reported diagnosis from the subject as gold standard, which in some cases may not be true. The psychological profile of the patients may hinder the true reporting of low back pain, as might the severity of the low back pain.<sup>14,15</sup> It is a limitation of this study that a categorical scale of no pain and pain was used to determine our results, as no scale of severity was reported in this study. Based on this limitation, it was not possible to distinguish between subjects with stronger low back pain and those with mild low back pain and whether these differences affected our findings.

### Sensitivity and Specificity

General parameters of accuracy of a diagnostic test are described as diagnostic specificity and sensitivity.<sup>13</sup> ICV testing had a sensitivity of 86.6% (Figure 1) in detecting reported low back pain. The results demonstrate a strong probability that when the ICV test is positive, a subject will have low back pain. The ICV test had a specificity of 97.0% (Figure 2) implying that a negative test is associated with a subject who did not have low back pain. In a study conducted by Côté *et al.*,<sup>16</sup> the diagnostic accuracy and inter-examiner reliability of common scoliosis diagnostic tests was investigated (Adam's forward bend test and the Scoliometer). These tests were compared with the Cobb method that served as gold standard. The Scoliometer had a sensitivity of 71% and specificity of 83%, whilst Adam's forward bend test was 92% sensitive and 60% specific in detecting thoracic curves with the Cobb method. Adam's forward bend test was more sensitive than the Scoliometer, however the Scoliometer was more specific, yielding a lower proportion of false-positive results. When compared with levels of specificity and sensitivity of that study, the ICV test was highly specific, and extremely sensitive in both occurrences of low back pain and no back pain. A false-positive response, which would diminish the diagnostic specificity, was recorded in only one subject (3%). Both findings present a productive picture of accuracy, which is required for the use of this test in the clinical domain.

### Predictive Values and Likelihood Ratios

It is also possible to summarise information about the diagnostic test itself using predictive values and likelihood ratio measures. The predictive value is a function of the prevalence, sensitivity and specificity of the test. The positive predictive value of the ICV test (98.0%) is the probability that a person whose test result responds positive to ICV testing truly has low back pain. The negative predictive value of the ICV test (78.0%) represents that the probability that a person whose response is negative to ICV testing truly does not have low back pain. Results from the testing of the ICV point with the occurrence of low back pain display high proportions of predictive functions for applying the test in the clinical setting. The likelihood ratio combines information about sensitivity and specificity. It reports how much a positive or negative result changes the likelihood that a patient would have the condition. The likelihood ratio for a negative result shows that the odds of the condition decrease by 0.14 when a test is negative. Alternatively, the ICV likelihood ratio for a positive result shows that the odds of the disease increase 28.6 when a test is positive, *i.e.* the subject's positive test result is 28.6 times as likely to be seen in someone with low back pain than in someone without.

### Youden's Index and Kappa

The diagnostic competency, according to Youden's index, of 0.835 was closer to a value of 1 than that of 0, demonstrating excellent diagnostic value. Pearce stated that Youden's index is the best single measure of validity.<sup>17</sup> With a good measure of validity, it would be recommended the testing of the ICV point as a diagnostic measure for the occurrence of low back pain. According to this result, strong evidence exists for the use of this diagnostic test as a high quality predictor of low

back pain in the clinical setting. Kappa has a range from 0-1.00, with larger values indicating better reliability. Generally, a Kappa >0.70 is considered satisfactory, so the Kappa of 0.79 we obtained is a satisfactory result.

### Limitations

Despite these findings, the results are limited by several factors. This study does not report on the inter-tester reliability of this procedure. A previous study has reported the inter-examiner reliability of using the deltoid muscle test in a reproducible fashion.<sup>10</sup> Despite the fact that the experimenters attempted to remove all verbal cues indicating low back pain, it is possible that the assessing practitioner derived some information from visual cues of gait and other body language as to the status of the subject's level of low back pain. An attempt was made to minimise this effect by not including acutely injured patients or those that were noticeably antalgic. Another limitation to this study would include subject bias. It has been reported previously that there are specific gender differences in reporting generalised pain conditions, with women having a much more diminished pain threshold than men.<sup>18</sup> The self-reporting of low back pain by this cohort with a majority of females may have been different to another group of subjects that were evenly matched for gender. We would also recommend a cohort with a uniform age and/or pain representation. The utility of the ICV test in different pain populations remains to be assessed.

This test forms the basis of an extensive diagnostic and treatment protocol used by chiropractors.<sup>5,6</sup> Whilst the results support the use of this test as an indicator of LBP, they do not support its use for other applications. Further study is warranted to investigate every application of this test in the diagnostic and management milieu.

### CONCLUSION

The majority of subjects with low back pain reported positive ileocecal valve testing, and all but one of subjects without low back pain reported negative ileocecal valve testing. The application of ileocecal valve testing as a diagnostic measure of low back pain was found to have excellent measures of sensitivity, specificity and diagnostic competency. This study confirms that the use of this test within the limitations of this study is reliably associated with the presence of low back pain. Further testing is required to investigate all aspects of the diagnostic milieu commonly used by proponents of this form of diagnostic testing.

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