

# THE RELIABILITY OF CHIROPRACTIC METHODS USED FOR THE DETECTION OF SPINAL SUBLUXATION.

## An overview of the literature.

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### INTRODUCTION

The literature shows that there is now a reasonable body of evidence that manipulation is useful for the treatment of acute low back pain (1,2). Interestingly this is irrespective of diagnosis, except for the exclusions for the trials which generally included neurological signs and bone pathology.

The study by Meade et al (2) in the UK compared chiropractic treatment with hospital out-patient treatment for the management of low back pain. This was a pragmatic randomised controlled trial in which the authors concluded that chiropractic treatment was more effective than hospital out-patient management which consisted mainly of physiotherapy. A difficulty with the trial is that it was not "treatment specific", as acknowledged by the authors. That is, it was not a trial comparing for instance spinal manipulation with ultrasound and exercises. However, a close review of this article shows that it was a sound randomised controlled trial and their general conclusions are supported by the study.

The meta-analysis of clinical trials of spinal manipulation conducted by Anderson et al (1) included 23 randomised clinical trials. Because some of the trials included multiple comparisons of various treatments there were a total of 34 mutually exclusive discrete samples analysed. The authors concluded that spinal manipulative therapy proved to be consistently more effective in the treatment of low back pain than were any of the array of comparison treatments. The major limitation of the study was the diverse range of protocols found from study to study. Nevertheless, the analysis appears well conducted.

In another meta-analysis Shekelle et al (3) reviewed the use, complications and efficacy of spinal manipulation as a treatment for low back pain. After analysing and weighting each paper on a ranking scale for validity and protocol preparation they concluded that spinal manipulation is of short term benefit in some low back pain patients, particularly those with uncomplicated acute low back pain. The authors also

concluded that the data were insufficient concerning the efficacy of spinal manipulative therapy for chronic low back pain.

So much for manipulation and back pain, but what of the methods used by chiropractors to detect spinal subluxation the entity notionally manipulated to relieve back pain? "Chiropractic subluxation" has no gold standard of measurement. Therefore, despite many attempts at a suitable definition, it is the authors opinion that no acceptable definition has been found. Consequently for the purposes of this paper chiropractic subluxation will be equated to and also described as a "manipulable spinal lesion".

The question of the reliability of the methods likely to be used by chiropractors to find spinal subluxation(s) is addressed in this paper. Because of the enormity of the task an overview is given as each method could by itself be the subject of a complete literature review.

### METHODS

The English language literature was searched in order to identify the major studies that have been published relating to the reliability of chiropractic methods of detecting spinal subluxation (manipulable lesions) and summarise their findings.

Medline and Australasian Medical Index were searched from 1972 to 1993. In addition a manual search of Chiropractic Library Consortium (4) an international chiropractic database held at RMIT Bundoora library was conducted.

Key words used were chiropractic, subluxation, measurement, detection, reliability and validity.

In addition a search was conducted on each of the diagnostic methods initially identified as likely to be used by chiropractors. They were static palpation, pain description of patient, orthopaedic tests, motion palpation, visual posture analysis, leg length discrepancy, neurological tests, plain static erect x-rays, kinesiological muscle testing, functional x-ray views, SOT diagnostic tests, CT scans, MRI scans, neurocalometer, EMG/Nerve conduction studies, and thermography.

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Key words used were “The method”, spine, reliability, validity.

A bibliographic search was also undertaken using “The Resource Guide to Chiropractic” which documents the majority of chiropractic literature from 1895 to 1981 (5). A selective bibliographic search was then performed on key texts by authors Palmer (6), Janse (7), Homewood (8), Illi (9), Maynard (10), Reinert (11), Goldstein (12), Haldeman (13,14), White (15), Gatterman (16), Maigne (17), Joseph (18), Fisk (19), Mennell (20), Buerger and Greenman (21) and Kirkaldy-Willis (22). Three important Government Inquiries into Chiropractic in Australasia were also reviewed (23,24,25).

## **RESULTS**

A review of the literature confirmed that sixteen methods identified by the author were likely to be used by chiropractors to identify subluxations or manipulable lesions. A summary of the sixteen methods used in the study is given below including a brief overview of the reliability of the methods in the detection of subluxation. In many instances there are no studies of this nature.

It should be noted that reliability does not mean validity. Reliability is the extent to which repeated measurements of a relatively stable phenomenon fall closely to each other, while validity is the degree to which the results of a measurement correspond to the true state of the phenomenon being measured (26). For instance, palpation of the spine might be highly reliable, but it may not correspond at all to the existence of a manipulable lesion.

### **1. Visual posture analysis**

Visual posture analysis by chiropractors generally focuses on symmetry of the frame particularly the pelvis, spine, shoulders and head position (27). The visual postural analysis may give visual clues to underlying spinal abnormalities such as scoliosis, short leg syndrome, kyphosis, lordosis, spondylolisthesis and antalgia (11, 27, 28). It is contended by some chiropractors that such postural deviations may be pointers to underlying manipulable lesions. According to chiropractors Panzer, Fetchel and Gatterman (28) “ Faulty posture creates mechanical stress and weakness of the human spine. It has an insidious effect upon the vertebral column” they further state that “... manipulation of the offending primary site (subluxation) is essential if postural retraining is to be effective”.

But is posture actually a cause of subluxation? No papers were identified which specifically examined this question, however there was some research on the ACO

association between posture and spinal pain. One study demonstrated such an association between posture and spinal pain (29). This research of 88 subjects showed that persons with severe postural abnormalities of the cervical and thoracic spine had a significantly increased incidence of interscapular pain when compared to a group with mild postural changes.

A study of the inter-examiner reliability of visual observation by chiropractors has been conducted. The visual inspection was for skin lesions and muscle asymmetries at each lumbar segment. The percentage agreement for this visual observation ranged from 86% to 100% (Kappa .34 - .84)(30).

There was no literature identified which supports any association between posture and subluxation.

### **2. Pain description of the patient (e.g. “my pain is here”).**

A thorough history including a description of the patient’s pain (particularly its location) is not unique to chiropractic. However, it is an integral part of chiropractic practice. It can be postulated that the area of pain described by the patient may reveal an underlying manipulable lesion. Chiropractors often ask key questions on pain in the assessment of back pain including site, duration, frequency and nature (31).

Some authors suggest that chiropractors should also determine the site of pain when the problem began, where it is now and examine and evaluate those painful sites (11,27).

With respect to subluxation and pain Janse (32) is more specific, “Ordinarily when a subluxation is of sufficient severity to cause marked pressure upon a nerve, there will be pain felt at the point impinged”. He goes on “ Whenever ... the patient complains of a pain in a certain region of the body, the chiropractor should always look carefully for a subluxation in that spinal segment from which the nerves supply”.

However, no scientific papers were found on the association between patients reported site of pain and the location of spinal subluxation by chiropractors. Yet, it remains an integral part of chiropractic diagnosis.

### **3. Functional X-Ray Views (eg. flexion/extension views)**

Functional x-ray views are radiographs taken of an area of the spine but with the spine in different positions. These images are then analysed for aberrations in bone movements or locations (33). Two

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chiropractic radiologists define subluxation as occurring "... when there is a partial loss of contact between the usual articular surface components of a joint. The joint surfaces are incongruous, but a significant portion remains apposed". They set out numerous measurements used in functional x-ray views of the spine to determine subluxation (34). But what about the reliability of these methods particularly in the hands of chiropractors and also what is the correlation between pain, abnormal motion and subluxation on functional x-ray views? Haas et al (35) studied the inter-rater reliability of 3 chiropractors using lateral lumbar views of 58 student volunteers and found that the use of lumbar lateral bending radiographs in clinical practice should be questioned because although there was good reliability (Kappa .49 - .65) for the lumbar spine between L1 and L4. There was poor reliability at L5 (Kappa .24). In another study the reliability of extension/flexion radiography was reviewed by analysing the measurement variation of 30 patients with well established spondylolisthesis (36). The authors found that the overall consistency and concordance were good (mean inter-observer variation of 2.6 degrees) but cautioned against the value of one single reading of an extension-flexion view because of the difficulty in defining exact landmarks used for the measurements.

Haas et al (37) studied the relationship between lumbar motion from functional x-ray views and their correlation with low back pain. They concluded that low back pain is not associated with lumbar motion on lateral bending.

So it appears that the reliability of functional x-rays is still in doubt.

#### 4. Thermography and Neurocalometer

Infrared thermography measures the radiant heat loss of the body that occurs in the infrared radiation range (38). The object is to observe any temperature differential which indicates a warmer or cooler side. The hypothesis being that the warmer side may indicate underlying subluxations which are the cause of the temperature change.

Accurate and repeatable thermographic examinations are time consuming and dependent on standardised procedures. It is uncommon to find perfect symmetry in the thermographic pattern of the spine, however "basic" symmetry can be expected in a healthy subject (38).

Plaughter (39) undertook an extensive literature review of skin temperature assessment for

neuromusculoskeletal abnormalities of the spine. This included the chiropractic literature. He found that relatively few reliability studies exist for thermography. Sensitivity of the instruments has been encouraging but specificity has shown mixed results. He concluded that because of the lack of an available gold standard, comparing thermographic findings is a problem.

The Neurocalometer is an instrument which also measures skin temperature but does so by conduction. The Neurocalometer (and its facsimiles such as the nervoscope) are hand held devices with thermocouples designed to measure heat on either side of the spinous processes in a symmetrical fashion (38).

However, measurements from these instruments have not shown good discrimination and their reliability is highly doubtful (40). A later study between two examiners found varying reliability depending on the region of the spine being analysed, with fair to moderate concordance between C4 and T2 (Intra-class Correlation Co-efficient .35 - .43), and substantial agreement between T4 and T8 (ICC .66) (41).

There was no reference found in the literature to any studies of an association between thermography or the neurocalometer and chiropractic spinal subluxation.

#### 5. Plain static erect x-ray views (including Gonstead line marking).

From as early as 1910 radiography and radiology have been taught in chiropractic colleges (33). Lines are drawn on the x-ray of the spine and these lines are used to determine the presence of subluxations. However, the technique is controversial. For instance the Gonstead Line Marking analysis is taught in nearly all chiropractic colleges (as an integral part of practice) and touted as being scientifically verified under controlled conditions (42). In some colleges it is a method advised to be used in all low back pain patients, yet other chiropractic educators such as Phillips (43) believe chiropractors should justify (presumably scientifically) the use of all plain radiographs before their use.

The use of erect views of the spine is the method of choice by chiropractors (12) so that spinal distortion under the influence of gravity can be visualised. Radiographs are used by chiropractors to rule out pathology in patients seen with back pain as well as for biomechanical evaluation (including subluxation detection). However, the literature fails to support the use of x-ray films for subluxation (44). Erect views are considered useful for evaluating the degree of (i)

idiopathic scoliotic curvature (45), and (ii) postural scoliosis due to leg length inequality (46). Yet, even the reliability of the measurement of the Cobb angle in scoliosis and kyphosis has been found to be wanting (47). One such study found that "...if one were to be 95% confident that a measured difference represented a true change, the difference would have to be 10 degrees for scoliosis radiographs and 11 degrees for kyphosis radiographs".

In November 1972 in conjunction with the annual workshop of the American Chiropractic College of Roentgenology and other representatives of the profession, a meeting took place to formulate statements on the definition, manifestations and significance of subluxation. The resulting consensus statement (33) gave these definitions of subluxations from plain x-rays:

1. Flexion malposition
2. Extension malposition
3. Lateral flexion malposition
4. Rotational malposition
5. Anterolisthesis
6. Retrolisthesis
7. Laterolisthesis
8. Altered interosseous spacing
9. Osseous foraminal encroachment

Often these "subluxations" are measured with lines drawn on the radiographs. The most popular line drawing method is the Gonstead method (42).

## **6. Computed Tomography and Magnetic Resonance Imaging**

Both computed tomography (CT) and magnetic resonance imaging (MRI) have important roles in spinal imaging. However, their role in diagnosis of spinal subluxation by chiropractors is less clear. A 1985 study by the author (48) looked at a series of cases with low back pain and/or sciatica and reviewed the differences between the plain x-ray findings and the CT scan results. The findings of both modalities did not correspond, with the CT scans providing potentially significant additional pathology in 21 of the 23 cases. However, the question of spinal subluxation was not canvassed. It is conceivable however, given the common use of plain x-rays and the notion by some chiropractors that spinal degeneration and subluxation are correlated, that chiropractors could turn to CT and MRI for subluxation detection.

CT scans, like plain radiographs do not demonstrate pain. One study showed that over 35% of

asymptomatic people were found to have abnormal CT scans, and over 19% of those study subjects under the age of 40 were diagnosed as having herniated nucleus pulposus (49).

CT scans are best used to see bone while MRI produces better images of soft tissues (50). MRI seems to be a sensitive and specific imaging modality for detecting pathological biochemical disc changes in the spine of a young adult (51) and in a study of 75 young low back pain patients the authors concluded that MRI is a safe and sensitive method for studying the etiologic factors of disc degeneration (52).

However, other studies (53) found that for the diagnosis of herniated nucleus pulposus CT scans had a 24% false positive rate and 29% false negative rate, while they also found that MRI scans had a false positive rate of 13.5% and false negative rate of 35.7% (54).

Dvorak et al (55) found in a cadaveric study that functional CT scans can show "subluxation" of the occipital-atlanto-axial complex, while Zucherman et al (54) reviewed a series of 18 patients with disabling low back pain who had normal MRI scans and abnormal discography and CT-discography, confirming that MRI was unable to detect "significant pathology" in these cases.

Chiropractors in Victoria have limited ordering access to both CT and MRI scans through WorkCover, Transport Accident Commission and patients who are prepared to pay themselves.

## **7. Leg length discrepancy**

Leg length discrepancy (LLD) may cause the pelvis and the spine to tilt, as a consequence it is postulated that the tilt may cause spinal pain (57). If LLD does cause low back pain, the controversial question that is often raised is "What is the significant measure of LLD needed before there is an association with low back pain in the population". Giles (58) studied 1914 patients using an erect AP radiograph of the pelvis and lumbar spine. 354 had LLD of 1 cm or more. He found, notwithstanding a smaller than ideal control group, that those with chronic low back pain were more likely to have an LLD greater than 1 cm when compared to control cases. In another study of 247 men and women aged 35-54 years, 53 had LLD with a mean of 5.3 mm but all were symptom free and had been during the past 12 months (59).

One author claims that LLD may cause pelvic subluxation and low back pain which may respond to

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manipulation (28). However, another looking at leg alignment and chiropractic adjustment (manipulation), concluded that the changes of leg alignment to a rotatory adjustment appears to be diagnostic illusion (60).

The relationship between LLD, low back pain and subluxation has been the subject of some controversy in the chiropractic profession and recently this led to a consensus process the findings of which were published in 1993 (61).

The chiropractic consensus panel found that with respect to anatomical leg length inequality (LLI) (ie. where the legs are anatomically different in length):

1. *In some carefully controlled settings, radiographic leg length inequality measurement has been shown to be reliable.*
2. *Field practitioners should be trained in standardised procedures in order to produce a viable and reliable system of measurement.*
3. *The role of posture asymmetry, such as leg length inequality, is worthy of continued study in chiropractic.*

With respect to functional LLD (ie. where the legs are the same length anatomically but appear different due to spinal or pelvic distortion) the panel made these findings:

1. *Leg length mensuration is safe, but its reliability and validity has yet to be established.*
2. *In some carefully controlled settings, functional LLI measurement has been shown to be reliable. However, the variability in general practice of standardised measurement procedures severely limits the applicability of the findings of these studies.*
3. *Practitioners ought not to rely solely on the results of leg checks to determine the course of treatment.*
4. *The role of posture asymmetry, such as functional leg length inequality, is worthy of continued study in chiropractic.*

There are many methods of measuring LLI including using tape measures, plain erect pelvis x-rays to compare femoral head heights and also the use of the scanogram (28). LLD forms an integral part of the diagnosis used in two chiropractic technique methods known as Derifield-Thompson technique (62) and

Activator Technique (63). It appears the “jury is still out” on LLD and consequence subluxation.

### 8. EMG/Nerve conduction studies

Electromyography and nerve conduction studies (electrodiagnosis) evaluate neuromuscular function (38). These include measures of myoelectric activity during muscular loading, fatigue studies, conduction velocity tests, H-wave and F-wave responses, and evoked potentials. According to Triano et al (39) some of the potential uses for electrodiagnosis within the scope of chiropractic practice are:

Suspected hyper and hypo tonicity, dyskinetic patterning, low back pain, myogenic and neurogenic atrophy, myasthenia gravis, acute nerve injury, neuritis, compression neuropathy, excitability curves, suspected descending pathway lesions. However, the authors specifically state that the potential use of electrodiagnosis for subluxation detection is undetermined.

According to Haldeman (64), in the USA electrodiagnosis is widely used and ordered. He adds that its effectiveness and reliability in detecting pathology has often been questioned. In his view this is due to “a lack of understanding of the capabilities and deficiencies to the various tests, the indiscriminate use of only one testing procedure ... poor technical capabilities (by the operator), or excessive expectation by the physician ordering the test”. In 1988 the same author and two colleagues (65) studied 100 patients with chronic low back pain and sciatica and found that “Electrodiagnostic tests often defined a radiculopathy in patients with equivocal clinical signs”. However, they cautioned “...in chronic sciatica patients, no single diagnostic parameter is conclusive and a combination of clinical and laboratory findings is necessary to reach a diagnosis”.

In a smaller study of 20 patients with “radicular syndrome” the authors made the similar conclusion that electrodiagnosis is recommended but only if radiology and clinical testing conflict (66).

A reliability study of surface EMG performed by 3 chiropractors on 28 subjects found an intraclass correlation co-efficient ranging from 0.2 to 0.55 or slight to moderate reliability (30).

### 9. Kinesiological Muscle tests

Applied kinesiology (AK) is a “fringe” technique which uses manual muscle testing to determine muscle weakness which is said to reflect many types of somatic and visceral dysfunctions (67). Some

dysfunctions (subluxations) are claimed to be directly related to the spine and (treatable) with adjustments (manipulation); others are said to be related to visceral patho-physiology, nutritional deficiencies (questionably found by placing a food substance under the tongue), "craniosacral dysfunction" and "blocked meridian systems". Strengthening of a weak muscle is considered to indicate successful treatment.

Triano (68) conducted a controlled study of the reliability of an AK clinical muscle test as an index of nutritional assessment. He found no relationship between the muscle test and nutrient substances placed sublingually.

The rationale for AK appears to defy biological plausibility.

#### **10. Sacro-occipital technique (SOT) diagnostic methods**

SOT is another "fringe" technique in which the pelvis, sacrum, cranium and the flow of cerebro-spinal fluid are considered important (67). Through a variety of "postural", "muscular" and "neurological" tests (including body sway), patients are placed into one of three categories of pelvic dysfunction (67).

The SOT treatment involves placing wedges in defined locations to "reposition" the pelvis as the patient lies either prone or supine (67). This allegedly corrects the underlying "biomechanical" problems and restores health to the patient.

The underlying hypothesis of SOT involves (amongst other things) aberrant cerebro-spinal fluid (CSF) dynamics, however there is no scientific evidence that manipulation or the wedges can effect CSF dynamics (69).

One SOT diagnostic test known as the "Arm-Fossa" test has been studied. LeBoeuf (70) found that sensitivity for the test as a predictor of spine pain was 54% and specificity 69%. In a later study the same author (71) concluded that "It appears unlikely that SOT tests can be reproduced to a sufficiently high degree to constitute useful clinical procedures". It is the author's view that the rationale behind SOT also appears to lack biological plausibility.

#### **11. Orthopaedic and Neurological tests**

Chiropractic spinal examination can be separated into orthopaedic and neurological portions. Both orthopaedic and neurological examination generally challenge tissue to determine its functional or

pathological state (72). These tests are no different to those used in a medical examination of the spine, for instance ranges of motion, straight leg raising, cervical compression, tendon reflexes, muscular strength tests and sensation tests. Several chiropractic texts have detailed sections dealing with orthopaedic and neurological examinations (11,13,72,73,74). But what about the reliability of spinal orthopaedic and neurological tests generally?

One study found that reliable signs consisted of measurements of flexion range, pain on flexion and lateral bend, measurements of straight leg raising, pain location in the thigh and legs and sensory changes in the legs. Signs of root tension showed better agreement when qualified with a description of where the pain was experienced (75).

However, with respect to sensation Nitta et al (76) studied the distribution of lumbosacral dermatomes by means of selective lumbar spinal nerve blocks and found marked differences between individuals' dermatomal distributions.

An Australian study found satisfactory inter-examiner agreement (>68%) by chiropractors on all lumbar ranges of motion except extension. Also satisfactory were straight leg raising, double leg raising, straight leg raising (SLR) with neck flexion, axial compression, sacro-iliac stress test and sacral base springing (77).

In another study of the correlation between sciatic tension signs and lumbar disc herniation at operation, the authors found that SLR was the most sensitive pre-operative physical diagnostic sign for correlating intra-operative pathology of lumbar disc herniation (78).

But can orthopaedic and neurological tests detect the location of spinal subluxations? No direct reference to this question was found in the literature. Nevertheless they very likely are used widely by chiropractors to "detect subluxation".

#### **12. Static Palpation**

The use of palpation for tenderness and pain by "bone-setters" is documented as early as 1871 in Wharton Hood's treatise "On Bone-Setting" (79). Bone setters were the early manipulators in British culture. They handed down their secrets father to son (79). Chiropractic originated some 24 years later in 1895 (6) and palpation became an integral part of manual diagnosis for subluxations (7). Palpation of vertebral prominences and soft tissues for pain, spasm and

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“mis-alignment” have also been an integral part of chiropractic training (7,11).

The term static palpation indicates that the patient remains generally still during the procedure. There has been considerable research into the reliability of static palpation. The reliability of sacro-iliac joint palpation by chiropractors has been studied and revealed only fair inter-examiner reliability (Kappa .314) (80). Whereas Boline et al (30) found good to excellent agreement in a trial where chiropractors palpated lumbar segments for pain (Kappa .48 -.90). Jull, Bogduk and Marsland (81) compared cervical spinal palpation to a “gold standard” of diagnostic nerve blocks with anaesthesia. Palpation was able to correctly differentiate the patients and their symptomatic level from controls.

The inter-rater reliability of randomly paired therapists was examined using 50 patients with 197 “trigger points” as defined by Travell and Simons (82). This revealed that different therapists are unable to reliably determine when a trigger point is present in a patient with low back pain (83).

Another study examining the interrater reliability of neck palpation in patients with neck and radicular pain for neck tenderness was poor to fair (kappa 0.24-0.56) (84). Nilsson (85) studied the reliability of the measurement of cervical muscle tenderness using a three category rating scale previously used for cranial tenderness. Fourteen volunteers were examined by two experienced clinicians who found excellent agreement between the examiners ( $r = .85$ ). Similarly, another study found that cervical spine tenderness is a highly reliable tool with good inter-examiner reliability (Kappa .68) (86).

The above sample of results shows varied conclusions. It seems that static palpation is not uniformly reliable in these trials and therefore one cannot conclude that it is a reliable procedure at this point in time.

### 13. Motion Palpation

The analysis of “joint play” or the movement of vertebral segments felt with the hands is known as motion palpation (72). Essentially, the chiropractor places his/her fingers over the suspect vertebral segment and the patient is asked to move through various ranges of motion. The chiropractor feels for “fixations” from loss of “joint play” (71) between one segment and another adjacent.

In a study of the reliability of motion palpation for the thoraco-lumbar spine by chiropractic students, the

authors found good intra-examiner reliability but poor inter-examiner reliability ( $R = .02$  -.08, where chance alone was represented by  $R = .3$ ) (87). Another study used 10 chiropractors and 11 patients to look at the reliability of motion palpation of the sacro-iliac joints. Good intra-examiner reliability and reasonable inter-examiner agreement was found. Interestingly, they also found that high expertise was associated with lower intra-examiner agreement scores (88). Mootz et al (89) undertook a study of the reliability of passive motion palpation of the lumbar spine. Two experienced chiropractors examined 60 volunteers. The examiners assessed each student for “fixation” in the lumbar spine. Every subject was evaluated twice by each chiropractor. There was minimal intra-examiner reliability (Kappa -0.11 to .46) and poor inter-examiner (Kappa -.05 to .17) reliability.

The results of the majority of the studies above and others formed part of a literature review of motion palpation conducted by Panzer (90). He concluded that the results varied and that most studies of motion palpation of the lumbar spine have demonstrated marginal to poor inter-examiner reliability and good to moderate intra-examiner reliability.

## DISCUSSION

Sixteen methods notionally used to detect spinal subluxation by chiropractors were isolated from the literature. There has been some research into the reliability of some of these methods used by chiropractors, however, the results are variable and inconclusive.

In short no method has been shown to be unequivocally reliable from the studies reviewed. In some cases these studies appear to have made the assumption that the methods tested were commonly used or considered the most reliable methods by chiropractors for detecting “spinal subluxations” (91,92,93,94,95,96). This may or may not be the case. Certainly, the same assumption is made in this literature review.

While it is not necessary for the various authors to concern themselves with these criteria for selecting a method to study, it could be considered a shortcoming as it would have been preferable if the chiropractic profession had first been asked “What is it that you use as methods to detect subluxation” before the various methods were tested for reliability.

This would have been a more pragmatic approach to studying the reliability of chiropractic diagnostic methods used to detect subluxation.

In Australia, there has been one study that surveyed general diagnostic tests used by a subset of recent chiropractic graduates (97). However again this paper did not address the specific issue of which methods are used by chiropractors to identify the manipulable lesion, but rather looked at the use of diagnostic apparatus such as sphygmomanometers.

No study was identified in the literature which attempts to identify the diagnostic methods that chiropractors use to identify "spinal subluxations". This question should now be tested by way of a survey of the profession.

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