
ORIGINAL ARTICLE

Characteristics of chiropractic patients treated at the University of Johannesburg chiropractic student clinic and relevance to the educational process

Fatima Ismail, MTech Chiro, Naomi Booyesen, MTech Chiro, Christopher Yelverton, MTech Chiro, and Cynthia Peterson, DC, MMedEd

Objective: This study aimed to analyze the demographic and descriptive information of new patients presenting to an educational institution-based chiropractic student clinic in South Africa that could then be used to draw comparisons to other international chiropractic student clinics and local practices.

Methods: We conducted a retrospective descriptive study of all new patient files from January 1, 2016, to July 31, 2016. The variables extracted were age, health profiles, number of musculoskeletal complaints, treatment protocol, and number of treatments that patients received for the initial complaint. Data were analyzed using cross-tabulations and multidimensional χ^2 tests.

Results: There were 865 files reviewed. Most patients were aged between 20 and 24 years. Lumbar and pelvic complaints were most common (42.2%), followed by the cervical spine (28%). Lumbar (18.8%) and cervical (16.8%) biomechanical conditions, followed by lumbar myofascial pain syndrome (7.6%), were the most common problems. Musculoskeletal conditions were reported in 99% of cases. The majority (80%) of patients received 9 or fewer treatments for their initial complaint. Manipulation was used in 93.9% of cases, followed by mobilization (8.8%), interferential current (23.5%), and dry needling (19.1%).

Conclusions: Data gathered suggest that there are some general similarities with international training institutions. There are also differences between the study sample and international institutions and South African private chiropractic practice. The dissimilarities were a younger patient population, a lower number of treatment visits, and low exposure to nonmusculoskeletal conditions. These differences may affect the breadth of student education and require further investigation.

Key Indexing Terms: Chiropractic; Spinal Manipulation; Retrospective Studies; Students; Education; South Africa.

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INTRODUCTION

The chiropractic profession has endured a tumultuous history in South Africa. Long-standing conflict with medical orthodoxy beginning in the early 1920s prevented chiropractors in the country from receiving fully legislated professional status until 1982.¹ The first group of South African qualified chiropractic graduates followed in 1994,¹ which coincided with the new political power at the time, the Government of National Unity,² ending apartheid in South Africa.

The postapartheid public health system seeks to reduce historical inequality by providing quality health care to previously disadvantaged populations in South Africa.³ One of the ways it is hoped that this will be achieved is through the implementation of National Health Insurance, which is a system that pools funds to provide access to

quality, affordable, and personal health care services for all South Africans, irrespective of their socioeconomic status.⁴

The current population in South Africa is estimated at 58.78 million people, while only 17 of every 100 people in the population have private medical insurance.⁵ This means that the remaining population of about 45 million are mostly reliant on free public health care. This public service overhead to the government was 157 billion rand in 2014–2015.⁶ The public health care system comprises 422 hospitals and 3,841 clinics and health centers.⁷ None of these health care facilities offer chiropractic care. There are about 800 private practicing chiropractors in South Africa, and they are situated in main cities and towns in the country.⁸ Chiropractic remains relatively excluded from the public health care structure in South Africa.¹ This, coupled with the foundations of the profession in Eurocentric models, leaves its services rather inaccessible by the general public sector,^{9,10} creating a unique impasse

in the South African context. The value and role of chiropractic in South Africa are questioned based on the impression that it is undervalued and inaccessible among indigenous South Africans.¹

Chiropractors are registered as primary contact practitioners who are trained to triage, differentially diagnose, and refer nonneuromusculoskeletal cases. Chiropractors use physical examinations with an emphasis on orthopedic, neurologic, and manual examination procedures.¹¹ The scope of chiropractic practice in South Africa includes an extensive range of manual therapies.¹² The University of Johannesburg (UJ) is 1 of only 2 institutions that currently offer chiropractic education in South Africa. The UJ chiropractic student clinic (UJCSC) is an educational institution-based training facility situated in the Doornfontein suburb of Johannesburg. The UJCSC provides affordable chiropractic care, at a cost to the patient, to the general public by senior students under the supervision of qualified chiropractors.¹³ This clinic serves South Africans in the region who seek chiropractic treatment and are not medically insured. The UJCSC provides services to students from the institution and people from the general public. Currently, South Africa does not offer government medical insurance, and treatment received at this site cannot be reimbursed by private medical insurance. Normal procedure in the clinic is that patients undergo a thorough case history interview, physical examination, and regional examination done by the student intern, after which a diagnosis is made together with the qualified chiropractic clinician on duty.

Knowledge of patient demographics, conditions, symptoms, and types of cases presenting to the chiropractic students may be useful for assessing the need for free and accessible chiropractic care. Such data may also inform future studies on musculoskeletal prevalence, burden of musculoskeletal conditions to the government, and patient outcomes studies. These potential studies are necessary to establish the role of chiropractic in mainstream health care in South Africa. Thus, the objective of this study was to analyze demographic and descriptive information of new patients presenting to the UJCSC. The extrapolated data could then be used to provide a term of reference from this specific setting and be used to draw comparisons to other local and international chiropractic training clinics.

METHODS

The research proposal for this study was approved by the University of Johannesburg Faculty of Health Sciences Higher Degrees Committee and Research Ethics Committee, respectively (REC-01-150-2017). The study was done at the UJCSC situated on the Doornfontein campus in Johannesburg, South Africa. This retrospective descriptive study used existing file numbers for the data collection period that lasted 4 weeks, from March 26, 2018, to April 20, 2018. The study sample included all new patients who visited the UJCSC between the period from January 1, 2016 to July 31, 2016.

To be included in the study, a patient consent form containing the signatures of the patient, the chiropractic student, and the clinician on duty was required for each case. By signing the consent form at the time of the consultation, the patients indicated that they were aware that their information could be used for research purposes in the future. A fully completed patient case history form was also required. Additionally, a fully completed progress note was required, and the file had to be present in the filing room at the time of data extraction.

All data recorded were collected manually, by one of the researchers/authors and transferred to a Microsoft Excel (Microsoft Corp, Redmond, WA) spreadsheet. Because data were recorded manually, there was a possibility of recording errors. Therefore, spot checks on 30% of the extracted files were performed at the end of data collection to audit the recorded data. The following variables were extracted from the patients' files: age; patient health profile (primary and secondary diagnoses and complaint on initial consultation); number of musculoskeletal and nonmusculoskeletal complaints; the health care treatment protocol; and the number of consultations that the patients received for the initial complaint. The number of treatment visits for the primary complaint was concluded once it was noted that a new complaint form was filled in and a new treatment plan was implemented.

A coding system of acceptable primary and secondary diagnostic conditions, per body region, was created and finalized by two of the researchers involved in this study. Various conditions were arranged into subcategories, which made that data more accessible for data analysis. The various regions of the human body were divided into main sections, including the cervical region, thoracic region, lumbar region, shoulder region, elbow region, hand and wrist region, hip and thigh region, knee region, and ankle region. Subheadings were also used for each category, which included all possible main diagnoses for that specific region/category. This coding system consisted of a total of 114 possible main diagnostic criteria (Supplementary Appendix A available online at www.journalchiroed.com). A data collection table was compiled to ensure that all the relevant data were presented on 1 spreadsheet.

Statistical Analysis

Data were analyzed using frequency procedures to obtain counts and percentages of response options for nominal (categorical) measures, such as complaint and diagnosis. Summary statistics were calculated for numeric measures, such as number of treatments. Interval variables were recoded to measure associations. Cross-tabulation and χ^2 were used to measure and test associations between nominal variables, such as categorized age and diagnosis. Cross-tabulation analysis was done to determine if there were any relationships found between the variables. Cramér's V was used to estimate effect size of associations. Statistical software (IBM SPSS version 25; IBM Corp., Armonk, NY) was used for data analysis.

Table 1 - Primary and Secondary Complaints Extracted From Patient Files

Body Region	Frequency (%)	
	Primary Complaint	Secondary Complaint
Lumbar and pelvis	365 (42.2)	21 (2.4)
Neck/cervical spine	242 (28.0)	18 (2.1)
Knee	67 (7.7)	15 (1.7)
Shoulder	50 (5.8)	3 (0.3)
Thoracic spine	39 (4.5)	3 (0.3)
Ankle and foot	38 (4.4)	3 (0.3)
Hip and thigh	37 (4.3)	5 (0.6)
Hand and wrist	15 (1.7)	2 (.02)
Elbow and forearm	6 (0.7)	0
Other	5 (0.6)	0
Systemic conditions	1 (.01)	0
Total	865	70

RESULTS

Of 900 patient files, 35 were excluded due to missing consent forms. Therefore, a total of 865 files were included in the study.

Age Demographic

Ages of patients in 5-year increments are presented in Supplementary Table 1, which is available online at www.journalchiroed.com. Ages ranged from 0.2 months to 86 years. The mean (standard deviation) of the patients' age was 40.9 (17.9) years. Most ($n = 133$, 15.4%) patients were 20–24 years of age.

Primary and Secondary Complaints

Primary complaints were present in all patient files, and 12.4% ($n = 70$) of these also contained a secondary complaint. The most common regions for both primary and secondary complaints were similar, ranging highest with lumbar spine and pelvis, cervical spine, and then the knee. The least common regions presented were the elbow, hand, and wrist regions for both primary and secondary complaints (Table 1).

Primary and Secondary Diagnoses

From the list of 114 possible diagnoses compiled by the researchers (Supplementary Appendix A and seen in Supplementary Table 2), 82 different diagnoses were used in the UJCS during the period from January 1, 2016, to July 31, 2016. A similar trend is seen both with primary and secondary (Supplementary Table 3) diagnoses, where the most common primary diagnoses seen in the clinic were lumbar biomechanical conditions, which accounted for 18.8% ($n = 163$) of the study population, cervical biomechanical conditions (16.8%; $n = 145$), and lumbar myofascial pain syndrome (7.6%; $n = 66$). Most common secondary diagnoses included cervical biomechanical conditions (1.5%; $n = 13$), lumbar biomechanical conditions (1.2%; $n = 10$), and lumbar myofascial pain

syndrome (0.9%; $n = 8$). Two participant files were referred for further investigation due to differential diagnoses of cauda equina syndrome and uncontrolled hypertension.

Relationship Between Most Frequently Primary Diagnosed Conditions and Age

Due to the vast number of possible diagnoses, the 8 most frequent diagnoses were evaluated in more detail, with the ages grouped into 4 categories (≤ 24 , 25–39, 40–54, ≥ 55), as seen in Supplementary Table 4. The oldest age group (55 and older) was underrepresented in the 2 most frequent (lumbar, 12%, and cervical, 7.6%) biomechanical diagnoses and overrepresented in other diagnoses, such as lumbar degenerative conditions (12%) and the grouping that consolidated all “other” diagnoses (46.2%). This association was found to be statistically significant ($\chi^2 = 114.0$, $p < .001$) with a medium effect size (Cramér's $V = 0.210$), indicating that there were associations between age and diagnosis. The analysis also suggests that, regarding this patient population only, younger age groups were more likely to experience biomechanical conditions.

The age groups 25–39 and 40–54 had the highest prevalence of lumbar biomechanical conditions (32.5% and 34.4%, respectively), while the lowest prevalence was the age group 55 and older (11.7%). The highest prevalence (34.5%) of cervical biomechanical conditions was in the age group 25–39, and the lowest prevalence (8.3%) was in the age group 55 and older. Those ≥ 55 years of age represented the majority of diagnoses of lumbar degenerative joint disease (82.6%) compared to 4.3% in the 25–39 year age bracket.

Musculoskeletal and Nonmusculoskeletal Conditions

Musculoskeletal conditions were defined as all conditions related to the locomotor system (muscles, bones, and joints) and their associated tissues (tendons and ligaments).¹⁴ Nonmusculoskeletal conditions were classified as all conditions not related to muscles, bones and joints, and their associated tissues. These conditions are not treated by the interns but were referred for consultation elsewhere, if necessary. Ninety-nine percent ($n = 856$) of the cases were musculoskeletal and eligible to be treated in the UJCS. The 1% ($n = 9$) of the study sample with nonmusculoskeletal conditions were referred for further investigation.

Relationship Between Number of Treatment Visits, Age, and Primary Diagnosis

Twenty-eight percent ($n = 242$) of the patients received 2 treatments for their initial complaint; 26.5% ($n = 229$) of the patients received 1 treatment, and 15.6% ($n = 125$) received 3. Only 9.4% ($n = 81$) of the total sample received 6–9 treatments, and 5.9% ($n = 51$) received 10 or more treatments for their initial complaints (Supplementary Table 5). For the purposes of this study, only 1 record was measured per patient; additional visits for a second problem were not included. A weak positive correlation was found between age and number of treatments ($r = 0.133$, $p < .001$).

Table 2 - Average Age per Region of Complaint

Region of Complaint	Frequency	Age (y)				
		Mean	SD	95% CI Lower	95% CI Upper	Range
Lumbar spine and pelvis	365	43.3	17.7	41.5	45.1	12.0–84.0
Neck and cervical spine	242	37.2	16.3	35.2	39.3	2.0–85.0
Knee	67	42.7	20.2	37.8	47.7	1.6–86.0
Shoulder	50	45.3	17.4	40.3	50.2	18.0–77.0
Thoracic spine	39	32.2	15.9	27.0	37.4	9.0–70.0
Ankle and foot	38	37.4	15.6	32.3	45.6	9.0–66.0
Hip and thigh	37	44.6	18.7	38.4	50.8	17.0–84.0
Hand and wrist	15	43.7	20.7	32.2	55.1	22.0–76.0
Elbow and forearm	6	44.3	13.4	30.3	58.4	28.0–65.0
Other	5	22.0	31.0	16.4	60.5	0.2–75.0
Systemic conditions	1	73.0	–	–	–	73.0–73.0
Total	865	40.9	17.9	40.0	42.1	0.2–86.0

The association between the number of treatment visits and the primary diagnosed condition was not statistically significant ($\chi^2 = 34.80$, $p = .70$).

Treatment Modalities

In 98.5% ($n = 852$) of the cases, 1 or more treatment modalities were utilized in the care of patients. The remaining cases ($n = 13$) did not receive any modality treatment because these cases were either not chiropractic related or they were referred for further investigation before treatment commenced. Manipulation was used in 92.5% ($n = 800$) of cases, mobilization in 18.5% ($n = 160$), ultrasound in 15% ($n = 130$), interferential current in 23.1% ($n = 200$), and dry needling in 18.8% ($n = 163$) of patients.

Combinations of modalities were utilized as part of the treatment process (Supplementary Table 6). The most common combination of modalities was manipulation only with 39.2% ($n = 339$), followed by manipulation and interferential current with 16.9% ($n = 146$), and manipulation and dry needling with 12.5% ($n = 108$). Lower frequencies were seen in cases where only 1 modality was utilized as part of the treatment protocol.

Relationship Between Age and Complaint

There were tendencies relating to the patients' age and their region of complaint (Table 2). The association between the age of the patient and region of complaint was found to be statistically significant ($\chi^2 = 168.7$, $p = .002$) with a small effect size (Cramér's $V = 0.14$). The highest mean age was associated with shoulder (45 years; $SD = 17.5$) and hip and thigh (45 years; $SD = 18.7$) concerns, while the lowest was associated with the thoracic spine (32 years; $SD = 15.98$).

DISCUSSION

From this study, it can be seen that most patients presenting to the UJCSC are between ages 20 and 54 years, which is similar to other demographic studies of this nature.^{15,16} However, a unique trend found in this study is

that the age group 20–34 years comprised 33.8% of the population. Young patient age groups presenting to the UJCSC are not representative of ages seen in private chiropractic practice in South Africa where the most common age groups are between the ages of 31 and 50 years.¹⁷ Nor is the UJCSC younger patient age typical of the patients reported in chiropractic student clinics in Canada, Switzerland, or Mexico.^{18–20} The age group 65 and older comprises 5.32% of the general population in South Africa,²¹ which is similar to the Mexican population of 7.22%.²² However, in the present study, there is a lower representation of the elderly. Exact reason why the clinic patient sample was younger than those in comparable studies is yet to be investigated.^{18–20} A demographic survey conducted for 1 month at the UJCSC during 2019 showed that 77.2% of the patients presenting to the student clinic were public patients, whereas 20% and 2.7% were university students and university staff, respectively. It was also observed that only 11.7% of the patients resided in the surrounding central business district, whereas the majority, 88.3%, were from areas outside the clinic's district.²³

This study revealed that most of the patients received 2 treatment visits for their initial complaint, followed by only 1 treatment visit and then 3 treatment visits. The average number of treatment visits per patient ranged from 1 to 4 treatment visits. These findings are not consistent with other studies, which show that the average number of treatment visits by chiropractic students in other countries are approximately 9.4²⁴ and 7 visits.¹⁶ The UJCSC's surrounding district, called Hillbrow, is known to have high unemployment rates and is also considered one of the most dangerous areas of the Johannesburg city due to increased crime levels.²⁵ These factors may play a role in patients seeking less treatment and then potentially returning for secondary complaints. These findings highlight the need to address possible paucities in the South African health system that currently deny the vast underprivileged public no-cost chiropractic care.

Research has shown that in order to successfully treat a condition, a higher frequency of treatments may be required.²⁶ An assumption should not be made that the

low number of treatments implies that the patients became asymptomatic, as no measure of patient outcomes was considered in this study. Low frequencies in the study conducted at the UJCSC can be explained by the fact that in this study the number of treatments was analyzed based only on the initial complaint. After the primary complaint was treated, the follow-up treatments were not counted. A weak positive correlation was found in this study between patient age and number of treatments, implying that as age increases, so do the number of treatment visits. This may explain why low treatment numbers were seen, considering many patients were of a lower age group in this study.

Another pertinent finding of this study is the descriptive analysis that there was a relationship between the diagnoses made and the age of the patient. It was evident that younger patients were more frequently diagnosed with biomechanical and myofascial diagnoses. To the contrary, patients 55 years and older were more frequently diagnosed with degenerative and arthritic conditions. Studies indicate that the prevalence of degeneration seen on diagnostic imaging dramatically increases by 80%–90% in the age group 50 and above, even if the degeneration may not be the direct cause of a patient's symptoms.^{27,28} These studies corroborate the observations in our study, indicating that degenerative conditions are possibly related to an older age group. We did not differentiate whether this degeneration was part of the normal aging process or a result of other causes. A review of the literature failed to confirm that other researchers also found that younger patient populations experience an excess of biomechanical conditions noted in this study.

Patients under the age of 19 years made up 8.6% of the patient population, the youngest patient being 0.2 months of age. This is dissimilar to other studies that show lower percentages of pediatric age groups presenting to student chiropractic clinics.^{15,24} Puhl et al.²⁴ found that only 2% of the patient population that presented to chiropractic students during their internship were between the ages of 6 and 17 years of age. Kaeser et al.¹⁵ noted that 13.9% of the patients presenting to a teaching clinic were between 0 and 17 years. Chiropractic is now being used more often by parents,²⁹ with manual therapy being the most common form of treatment chosen for children with musculoskeletal conditions in the United States.³⁰ This finding indicates that the patient base in this region is following the trend of seeking chiropractic care as a form of treatment for their children.

The age category that was represented the least was the age ranging from 70 and above. One would expect that the greatest number of patients would come from this age category due to the disease processes that occur with aging, such as increased joint pain and muscle weakness.²⁷ This study, however, only evaluated new patients who visited the clinic and not the existing patients, and thus chronic older patients were not measured.

Lumbar spine and pelvic conditions were the predominant primary complaints. The second most common region of complaint was the neck/cervical spine, followed by those who complained of knee problems. These findings are consistent with numerous other studies.^{15,17,19} The

most prevalent musculoskeletal complaint reported by patients to South African private chiropractors is lower back pain and pelvic pain/injury with or without leg pain.¹⁷ Abdominal pain and other nonmusculoskeletal conditions were the least common conditions seen in private chiropractic practice.¹⁷ Similarly, Lishchyna and Mior²⁰ in Canada showed that low back and neck complaints were the most common conditions reported diagnosed by chiropractors in that study.² In a study done in the United States, the most common ICD-9 code was for lumbago, which includes any complaints of pain in the muscles and joints of the lower back. Soft tissue and cervical primary diagnoses were less common.¹⁵

Not surprisingly, the frequency of secondary complaints, at just under 13% of patients, was far lower than that of primary complaints in this study. They were also lower than the number of secondary complaints reported by Martinez et al.¹⁹ at a Mexican chiropractic college public clinic where there was a 56.2% presentation of secondary complaints. This difference is most likely due to the very young patient population attending the UJCSC who would thus be less likely to have secondary complaints. The second most common secondary diagnosis was that of cervical biomechanical conditions, which is similar to the Mexican study, where cervical conditions were found to be most common.¹⁹ A possible explanation for this low prevalence of secondary complaints could be that students tend to focus on or document the main complaint before treating secondary complaints.

Chiropractors are commonly regarded as practitioners that exclusively treat musculoskeletal conditions.³¹ This limited categorization seems analogous to the patient population presenting to the UJCSC with a high musculoskeletal condition presentation of 99%. As primary contact practitioners in South Africa,¹ chiropractors need to be capable of identifying nonmusculoskeletal conditions and to refer them to other providers if necessary. This low presentation of nonmusculoskeletal conditions (1%) is of concern as it raises the question as to whether or not students in the clinic receive adequate exposure to these conditions in order to be effective primary care health providers.¹⁶ We hypothesize that student exposure would very likely advance with integration into local hospitals and clinics.

In this study it was possible to look at possible trends in the treatment protocol of patients. One of these trends is the number of modalities utilized as part of the treatment. In most cases, only 1 modality was part of the treatment protocol, followed by 2 modalities, then 3. Johl et al.¹⁷ investigated the scope of chiropractic practice in South Africa in 2015 and found that 65.4% of patients received manipulation during their treatments. The use of other treatment modalities was far less, with trigger point therapy utilized in 36.4% of patients, followed by massage (28.5%).¹⁷ This is a finding similar to that in our study, indicating a trend in South Africa to use a minimal number of treatment modalities.

Spinal manipulation was used in the majority of cases in the present study. Studies show that manipulation alone produces statistically significant improvements in the

patient's symptoms.³² A Canadian study showed that spinal manipulation was used as a treatment method in 70% of the cases at a chiropractic college.²⁴ However, the use of adjunctive treatment procedures during office visits has previously been reported as being relatively common in chiropractic practice and is reflected by the data in our study. Mobilization was the second most common treatment modality, followed by interferential current, ultrasound, and dry needling. Studies have shown that ultrasound, massage and heat, electrotherapy, cryotherapy, and traction and mobilization were identified as being among the most used modalities in chiropractic practice,³³ as was also found in this current study. In a more recent study, similar results were found, where 29% of practitioners used ultrasound or other electrotherapy modalities.²⁶

Future studies that would play a relevant role in policy might include investigating the prevalence of neuromusculoskeletal conditions and its burden to the economy in South Africa. Another possible study could consider how these conditions are dealt with in the current public health care system. The perceptions and satisfaction of patients regarding how their neuromusculoskeletal conditions were treated and resolved could add further insight into whether there is a need or benefit for a profession like chiropractic to be integrated into mainstream health care. Larger scale studies will need to establish the existing cost of neuromusculoskeletal conditions to the government to determine if chiropractic offers a more cost-effective option.

Limitations

This study is only representative of the UJCSC and not South Africa in general, even though there are only 2 public chiropractic clinics in South Africa. This study was solely descriptive and relied heavily on the notes taken by student interns. Although various interns' handwriting had to be read, there was no difficulty with deciphering any entries. Additional demographic data such as annual income, race, and medical insurance are never recorded on patient forms/files in the clinic and were not collected. Sex, although stated in patient forms/files, was not included as the Research Ethics Committee at the UJ deemed it unnecessary to include upon approval of the study.

Patients who were referred were not analyzed to determine where they were referred from and why. This could possibly give an indication of the interdisciplinary relationship that exists between chiropractic and other mainstream medical professions. The total number of treatments patients receive in the clinic, irrespective of the complaint, could be ascertained to indicate if these numbers are similar to international trends. This research was focused only on new patients who visited the clinic.

CONCLUSION

The demographic and descriptive information that was gathered from this study shows there are some general similarities with other international training institutions. However, there are also dissimilarities between this South African training clinic and international institutions and indigenous private chiropractic practice. The dissimilarities

are the presentation of a younger patient population, a lower number of treatment visits, and low exposure to non-musculoskeletal conditions. This younger population group was found to be more commonly diagnosed with biomechanical conditions, whereas the older patient population diagnoses were more likely to be degenerative conditions.

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About the Authors

Fatima Ismail is a lecturer in the Department of Chiropractic at the University of Johannesburg (John Orr Building, 7th Floor, University of Johannesburg, 55 Beit Street, Doornfontein, Johannesburg 2028, South Africa; fismail@uj.co.za). Naomi Booysen is with the Department of Chiropractic at the University of Johannesburg (John Orr Building, 7th Floor, University of Johannesburg, 55 Beit Street, Doornfontein, Johannesburg 2028, South Africa; mrsbooysen@gmail.com). Christopher Yelverton is head of the Chiropractic Department at the University of Johannesburg (John Orr Building, 7th Floor, University of Johannesburg, 55 Beit Street, Doornfontein, Johannesburg 2028, South Africa; chrisy@uj.ac.za). Cynthia Peterson is a professor in the Department of Chiropractic at the University of Johannesburg (John Orr Building, 7th Floor, University of Johannesburg, 55 Beit Street, Doornfontein, Johannesburg 2028, South Africa; xraydcpeterson@yahoo.ca). Address correspondence to Fatima Ismail, Department of Chiropractic, John Orr Building, 7th Floor, University of Johannesburg, 55 Beit Street, Doornfontein, Johannesburg 2028, South Africa; fismail@uj.co.za. This article was received November 22, 2019, revised March 6, 2020, and June 15, 2020, and accepted July 9, 2020.

Author Contributions

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