

An intercollegiate comparison of prevalence of injuries among students during technique class from five chiropractic colleges throughout the world: a preliminary retrospective study

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The purpose of this study was to compare the characteristics of injuries sustained by chiropractic students during their undergraduate training at different chiropractic colleges. Teaching instructors from English-speaking chiropractic colleges in the United States, Europe, Africa and Australia/New Zealand were electronically requested to administer a retrospective study that sought to characterize injuries students experienced during their technique labs. Four colleges responded to the investigators' request, returning a total of 405 questionnaires. Colleges were only identified by a letter and country/continent of origin. The number of responses from these four colleges was: College A (Africa) n=67; College B (United States) n=81; College C (Europe) n=143 and; College D (Australia/New Zealand) n=110. The percentage of students reportedly injured at each college was: College A (7%); College B (53%); College C (18%) and; College D (22%). These numbers were compared to previously gathered data from CMCC that reported a rate of student injury of 56% (n=292). There were no statistically significant differences between injured and non-injured groups of students with respect to age, body weight, height or sex. Additional gathered data that further characterizes these injuries among students from these four chiropractic colleges is currently under review. (JCCA 2008; 52(3):169-174)

KEY WORDS: chiropractic, student, injuries, technique

Cette étude a pour objet de comparer les caractéristiques des blessures subies par des étudiants en chiropratique durant leur formation universitaire de premier cycle dans différents collèges de chiropratique. On a demandé par voie électronique aux professeurs des collèges de chiropratique anglophones des États-Unis, de l'Europe, de l'Afrique et de l'Australie/Nouvelle-Zélande de mener une étude cas-témoins visant à déterminer la nature précise des blessures subies par les étudiants durant leurs laboratoires techniques. Quatre collèges ont accepté d'y participer, et ils ont retourné un total de 405 questionnaires. Les collèges étaient identifiés par une lettre et le pays/continent d'origine. Voici le nombre de réponses pour les quatre collèges : collège A (Afrique) n=67 ; collège B (États-Unis) n=81 ; collège C (Europe) n=143 ; et collège D (Australie/Nouvelle-Zélande) n=110. Le pourcentage d'étudiants blessés dans chaque collège était : 7 % au collège A, 53 % au collège B, 18 % au collège C, et 22 % au collège D. Ces chiffres ont été comparés aux données du CMCC recueillies auparavant qui avaient révélé un taux de blessure de 56 % (n=292). Il n'y a aucun écart statistique significatif entre les groupes d'étudiants blessés ou non relativement à l'âge, au poids corporel, à la taille ou au sexe. Les autres données recueillies afin de préciser la nature des blessures subies par les étudiants de ces quatre collèges de chiropratique font actuellement l'objet d'une étude. (JACC 2008; 52(3):169-174)

MOTS CLÉS: chiropratique, étudiant, blessures, technique

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Introduction

Manipulation, or spinal adjusting in the broader sense, is the activity that most distinguishes the field of chiropractic from other health care professions¹. The acquisition of psychomotor skills used in the delivery of therapeutic interventions such as manipulation is an integral component of chiropractic education². All chiropractic colleges, irrespective of their ideology (i.e. the extent to which they emphasize traditional chiropractic philosophy) or their preferential use of a particular technique system (Palmer HIO, Thompson Terminal Point, Logan Basic and so on), devote considerable time to the teaching of 'Diversified' high-velocity, low amplitude (HVLA) manipulative skills². This requires students to willingly act as both 'doctor' and 'patient' in technique labs. However, since students possess novice skills, and since these manual therapies are often delivered in the absence of clinical necessity, there is the possibility that students may injure themselves during technique class, a concern that is often raised during discussions of the Technique Consortium of the Association of Chiropractic Colleges (ACC).³⁻⁷ Indeed, many of the authors of this study, as well as the authors of the study by Macanuel *et al*² anecdotally report that they were injured during their undergraduate training. Moreover, there is a burgeoning body of knowledge in the peer-reviewed literature that indicates chiropractors and other manual therapists often injure themselves during either their undergraduate training or early in their professional careers. Since many of these injuries begin when the practitioner is a student, it is important to identify the frequency and characteristics of those injuries that do occur during his or her educational training in order to develop strategies to possibly avoid them.

A recently published retrospective study characterized the nature of injuries sustained in technique class by chiropractic students at one chiropractic college, the Canadian Memorial Chiropractic College (CMCC).² During recent discussions among members of the Technique Consortium it was decided that the study should be replicated at other chiropractic colleges as well, using the same (albeit imperfect) study design and questionnaire rather than an improved survey instrument, thus facilitating ease of comparison between respondent colleges.⁷ The questionnaire used was similar to the one developed by LeBoeuf-Yde *et al* that characterized injuries to patients under clinical care.⁸ Although limitations of the

questionnaire have been identified⁹ the members of the Technique Consortium opined that it would facilitate comparison if the original questionnaire was used in this study.

The purpose of this study was to compare the prevalence of injuries sustained by chiropractic students during their undergraduate training at a number of different chiropractic colleges. The *a priori* assumption was that there would not be any significant differences in reported injury rates among students from different chiropractic colleges.

Method

The Ethics Review Board of CMCC approved this study. Virtually all English speaking chiropractic colleges in North America, Europe, Africa, and Australia/New Zealand were electronically invited to participate in this study. Specifically, all North American chiropractic colleges were contacted, as well as colleges in Europe, Africa and Australia/New Zealand if a contact person at those colleges could be identified (this was not always possible by reviewing college information online). Typically, the Chair of the Technique Department was contacted, along with the Dean of Research. These representatives were informed that they would be asked to distribute the questionnaire to students during their technique classes. Upon receiving confirmation that the college was willing to participate, the contact person was sent a copy of the study for circulation. It was left up to the discretion of the contact persons at each college to decide whether or not participation in this study required approval of their ethics board.

Recruitment

When invited to participate in this study, some college representatives expressed concerns that any data published that reported students were injured at their respective college may generate negative publicity for them, adversely affect student recruitment or increase insurance premiums for the institution or even the student upon graduation. In order to address these concerns, representatives from each college were assured that their college would only be identified by a letter designation in any published work. Colleges would be only identified as to their country or continent of origin, as applicable. For example, if there was more than one English speaking chiropractic college in Canada, CMCC could have been identified as College A from Canada, in order to shield its

identity. This strategy sufficiently quelled the concerns of those colleges that chose to participate in this study.

Confidentiality

Students willing to participate in this study were not required to identify themselves on the questionnaire. In addition, to further ensure confidentiality, if a student had an identifiable anthropomorphic characteristic (i.e. he or she was the only 7 foot tall student at the college) he or she could elect to not complete that section of the questionnaire (in this example, the question that asks for the student's height would be omitted). Given the nature of this study, no deception was required.

Eligibility

The only requirement for participation in this study was that chiropractic students were either currently, or had previously been, instructed in manipulation.

Data Storage

Each student was required to complete a consent form and fill out the questionnaire anonymously if they chose to participate in the study. Completed questionnaires were then handed back to the person who had distributed them, who placed them in an envelope and sealed it. The questionnaires were mailed back to the Principle Investigator in another sealed envelope. Data was entered for analysis. All the data was double-entered. When not used, the data was stored in a locked filing cabinet. Upon completion of the study, all questionnaires will be destroyed.

Response Rate

According to the contact person at each chiropractic college, all students in each technique class who was asked to participate in this study did so.

Data Analysis

The investigators compared the percentage of reported first injuries among chiropractic students from each college to those gathered previously by Macanuel *et al.*² Anthropomorphic data (age, sex, weight, height) were also gathered. That data is presented in this study and presented in chart form.

Chiropractic colleges significantly differ with respect to the manner in which they divide their undergraduate programs. CMCC, for example, designates its undergrad-

uate program as 'year one,' 'year two,' 'year three' and 'year four' (during which students provide patient care as interns). Other chiropractic colleges who participated in this study divide their academic years into trimesters, whereas others divide their academic year into quarters, thus making a comparison of when in the program students reported they were injured to be problematic. In order to overcome this discrepancy between chiropractic colleges, the programs of all colleges were converted to the four year model used at CMCC. That data is also presented in this study.

Additional data collected included: location of injury; type of manipulation being performed at time of injury; time between manipulation and onset of symptoms; type of symptoms reported; year of study when injury occurred; intensity of symptoms; duration of symptoms and; treatment sought if injured. This data is currently under review.

Results

Four chiropractic colleges participated in this study. The total number of questionnaires returned from all participating colleges was 405, of which eight were not filled out properly and could not be used in the analysis. This resulted in a total number of 397 usable observations (collectively contributed by four data subsets). Data subsets were designated as follows: College A (Africa), College B (United States), College C (Europe) and College D (Australia/New Zealand). The number of respondents (and, therefore, observations) from each college was: College A (n=67); College B (n=81); College C (n=143) and College D (n=114) (Table #1).

Of the 397 data sets reviewed, 193 students identified themselves as men and 192 as women (12 did not identify

Table 1 *Number of respondents by college**

College A	67
College B	81
College C	143
College D	110

*According to the contact person at each of these participating colleges, all students provided a questionnaire completed and returned it.

Table 2 Comparison of injured/ not injured among chiropractic students from 5 chiropractic college):*

	CMCC	College A	College B	College C	College D
Injured Percentage	56%†	7%	53%	18%	22%
Number	n=165	n=5	n=43	n=26	n=24
Not injury Percentage	44%	88%	44%	75%	74%
Number	n=127	n=59	n=36	n=107	n=82
Location of College (continent or country)	Canada	Africa	United States	Europe	Australia-New Zealand

*Differences in number of respondents (Table 1) and injury/non-injury rate numbers (Table 2) is due to some questionnaires not being completed properly.

†Rate of first injury reported from CMCC students was 44% (n=127), but some students reported being injured on more than one occasion (n=161).

their sex). The average age of respondents was 26 years (standard deviation of 6 years). The average height of students was 173 cm (st. dev = 12.9) and weight 70.9 kg (st. dev= 15.2 kg).

In general, 98 students reported that they sustained an injury while in technique class while 284 reported that they were not injured. The percentage of students reporting to be injured was: College A (7%); College B (53%); College C (18%) and; College D (22%). The college with the lowest rate of reported student injuries was the African college (College A) whereas the college with the highest rate of reported student injuries was the American college (College B). This can be compared to a rate of student injury of 56% reported by Macanuel *et al* at CMCC² (Table #2). There were no statistically significant differences between injured and non-injured groups with respect to body weight, height, age or sex.

Using the method of converting the different ways that colleges divide their undergraduate programs into 'year of study' (as previously described in the 'method section'), students from the four colleges who reported they were injured were predominately in their second or third year of their chiropractic training.

Discussion

Injuries Among Manual Therapists

Manual therapists who perform manipulations, mobilizations or soft tissue therapies are at an increased risk of in-

jurying themselves either during their professional career (most commonly within the first few years of practice) or during their undergraduate education, as demonstrated by a review of the literature. A study by Jang *et al* reported that, among 161 massage therapist surveyed, 71.4% of them had at least one work-related musculoskeletal disorder (WMSD) in the past 12 months.¹⁰ Prevalence rates of WMSD were: 50.3% finger/thumb, 31.7% shoulder, 28.6% wrist, 25.5% neck, 23.6% arm or elbow, 20.5% forearm, and 19.3% back. Nearly one half of massage therapist in this study had thumb or finger symptoms within their first 5 years of practice. Jang *et al* cited other studies that reported massage therapists who routinely performed manual therapies were 2.5–3.5 time more likely to develop injuries to the wrist and hand than those therapists who did not deliver manual therapies.

An oft-cited 2000 study by Cromie *et al*¹¹ reported the lifetime prevalence of WMSDs among physiotherapists was 91%, with younger therapists reporting a higher prevalence of WMSDs than more experienced practitioners (initial onset usually within the first four years of practice). The most commonly injured sites were the low back (48%), followed by neck (12.2%), upper back (12.2%) and thumb (11%).

Two studies by Snodgrass^{12,13} reported very similar findings. Prevalence rates of thumb injuries have been reported to be 60% or more among those physiotherapists who apply manual techniques, often due to a cumulative effect of transmitted forces from the practitioner to the

patient.¹² Similarly, Glover *et al* published the results on WMSDs among physiotherapists in the United Kingdom.¹⁴ Career prevalence of WMSDs was 68%, with nearly one third of injured respondents sustaining an injury within the first five years of practice. The area most commonly injured was the low back (48%), followed by neck (33%), upper back (23%) and thumb (23%). The prevalence rates of all of these types of injuries were higher among female physiotherapists as compared to their male colleagues.¹⁴

McMahon *et al* sought to determine the lifetime prevalence of thumb problems among Australian physiotherapists using an observational study design.¹⁵ The authors of that 2006 study reported a lifetime prevalence rate of 65% and a current prevalence of 41%.¹⁵ Similar findings among Australian physiotherapists were reported in a study by West and Gardner.¹⁶

Injuries Among Chiropractors

Rupert and Ebete,¹⁷ using a mail survey of 1,500 randomly selected chiropractors (451 returned) reported that 57% of respondents had a WMSD during their career, most commonly affecting their wrist (52%), low back and hand (50% each), shoulder (35%), neck (22%), and upper back (21%). Most injuries (73%) occurred while performing manual procedures.¹⁷

A more recent study by Holm and Rose¹⁸ gathered data on work related injuries among field practitioners in the United States. One hundred and fifty-nine chiropractors (40.1% of respondents) reported experiencing a total of 252 injuries while working. Most of these injuries were classified as soft tissue injuries and occurred while either performing (66.7%) or positioning a patient for manipulation (11%). Most injuries (37.1%) occurred during the delivery of side posture lumbopelvic manipulation (SPLM), followed by manipulation of the thoracic spine (21.6%). The region of the body most commonly reported to be injured were the wrist/hand/finger (42.9%), shoulder (25.8%), and low back (24.6%). Most commonly the injury occurred in the first to fifth year of practice (37.3%) and, of particular relevance to this study, 5.4% reported they were injured while attending chiropractic college.

Injuries Among Chiropractic Students

The first study specifically investigating the characteristics of injuries sustained by chiropractic students during

their undergraduate training was published by Macanuel *et al.*² In that study, of 292 respondents, 127 (44%) students reported to have sustained an injury at a chiropractic college, although the total number of reported injuries was 161 (55%) (some students were injured on more than one occasion). The most common site of injury was the lumbopelvic region (34.8%), followed by the cervical spine (27.5%) and thoracic region (11.9%). The procedure most commonly associated with injury was SPLM. The manipulation known as the 'lumbar roll' (side lying pisiform/hypothenar-lumbar mammillary process push) was cited as the procedure most commonly associated with injuries. Unfortunately the study did not specifically differentiate between those students who were injured while *receiving* the manipulation from those students who were injured while *delivering* the manipulation. Local pain and stiffness were the most commonly reported symptoms. Symptoms resolved in three days or less in 75% of cases. Two thirds of students described the extent of their injuries as 'light' to 'a fair bit.' Activities of daily living were affected to some degree in over 83% of cases.

A similar study by Bisiacchi and Huber¹⁹ reported that the low back was the most commonly injured site reported by female chiropractic students, and the neck was the most commonly injured site among male chiropractic students. Wrist injuries were reported in 17% of female students. Bisiacchi and Huber reported that students were most commonly injured while performing full spine side posture manipulations.¹⁹ The second most common procedure resulting in student injuries was supine cervical manipulations.¹⁹

There could be a variety of reasons to explain the differences in injury rates reported in this study between chiropractic colleges. For example, some colleges may be less inclined to allow students to deliver an HVLA thrust in class in the absence of clinical indicators as compared to other colleges. Alternatively, since this study was international in design, certain cultural factors may have come into play as well. For example, the expression of pain, what constitutes an 'injury' and the willingness or likelihood of a student to report an injury may vary between cultures.

Conclusions

Of the four colleges that participated in this study thus far, the college from the United States reported a similar

rate of student injuries during technique class as compared to CMCC, whereas the other three respondent colleges reported much lower rates of student injuries. As more data accrues, it is possible that the characteristics of injuries among chiropractic students will be better defined, as well as those factors that are either provocative or protective. This information may be useful to help guide technique instructors to develop learning environments that minimize the likelihood of students sustaining an injury during the acquisition of psychomotor skill such as manipulation. Perhaps simply cautioning chiropractic students that they may experience an injury during their undergraduate training will increase their vigilance and subsequently reduce the frequency of such undesired events from occurring. Lastly, it is possible that instilling optimal ergonomic habits during undergraduate education may reduce the frequency of injuries sustained by manual therapists during their professional careers.

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Authors' note

Representatives from any chiropractic college who may wish to participate in this study are invited to contact Dr. Brian J. Gleberzon.

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