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Low Back Pain in Residential Construction Carpenters: Hispanic and Non-Hispanic Chiropractic Patient Differences

Purpose: Chiropractic utilization among residential carpenters has not been previously investigated. Carpenters are known to be at greater risk for low back pain (LBP) in comparison to the general population. Investigators evaluated the prevalence of LBP and associated risk factors among a bicultural group of residential carpenters in the Denver metro area. **Methods:** This nested cross-sectional study collected data from 335 residential carpenters regarding risk factors for occupational LBP and use of chiropractic services. A 91-question survey was designed in Spanish and English to gather information about personal and workplace characteristics and the point, annual, and lifetime prevalence of LBP. **Results:** Chiropractic services were used by 28% of the non-Hispanic and 3% of the Hispanic residential carpenters for treatment of LBP at some point in their lives. The point, annual, and lifetime prevalence of LBP among non-Hispanic carpenters was 14%, 38%, and 54%, respectively, whereas Hispanic carpenters reported 8%, 10%, and 19%, respectively. **Conclusions:** Chiropractic services among non-Hispanic framers exceeded national averages whereas Hispanic carpenters were below anticipated utilization levels. Key words: *chiropractic, data collection, Hispanic Americans, human engineering, low back pain, occupations, occupational health, risk factors*

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LOW BACK PAIN (LBP) continues to be America's number one occupational safety and health challenge.¹ The economic and human impact of LBP is unmatched by any other work-related injury; primary and secondary losses are estimated as high as \$100 billion per year.² Virtually nothing is known about the use of chiropractic services for treating LBP among residential carpenters. Lipscomb and colleagues³ identified a low back injury incident rate of 8.5 of 100 carpenters in their analysis of 10,935 workers' compensation claims submitted to Washington state. This rate is more than 500% higher than the 1.5 per 100 person incident rate reported for the US construction population for 1979.⁴ The annual prevalence rate for LBP has been reported at approximately 17% for the general population, with construction workers identified as a high-risk group for occupational LBP.^{5,6} Residential construction employs nearly one-half of the nation's 7 million construction workers, with carpenters comprising the single largest trade.⁷ Chiropractic care has been established as an effective treatment modality for LBP.⁸ The objective of this nested cross-sectional study was to principally investigate

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ergonomic risk factors, personal, and workplace characteristics associated with LBP in residential carpenters; effort was also placed on assessing chiropractic use for LBP in this select population.

METHODS

This study was nested within a larger longitudinal cohort study looking at the effectiveness of the HomeSafe Pilot Program, a safety and health program designed by Occupational Safety and Health Association (OSHA) Region VIII and the Home Builders Association (HBA) of Metropolitan Denver to reduce injuries and fatalities in residential construction.⁹ Approximately 5,500 framing carpenters were identified within the larger residential construction population of approximately 50,000 working in the program area, which was restricted to five counties in the Denver metropolitan area. The subpopulation of framing carpenters served as the study population. Company partners were volunteer members recruited by the HBA and OSHA Region VIII to the program. It was known that a large proportion of the framing trade was Hispanic. A cross-sectional study was designed, and data were collected using a 91-question survey focused at identifying risk factors for LBP as well as use of chiropractic services. The definition of LBP used in the survey was “an episode of low back pain that caused you to alter some aspect of your normal living or seek treatment.” Point prevalence was defined as an episode of LBP that occurred within the previous 2 weeks from the time of survey, and annual prevalence was defined as an episode of LBP occurring with the previous 12 months, whereas the lifetime prevalence was defined as “ever had” an episode of LBP. Chiropractic care was not defined *per se* in this study; respondents were asked if they consulted a health care provider (HCP) and were offered a list of HCP titles including chiropractor. Respondents were asked if they had ever consulted chiropractic services for their LBP. No effort was made to determine frequency. A total of 335 residential carpenters were randomly selected for onsite survey through general contractor companies within the HomeSafe program area regarding LBP and potentially related personal and workplace risk factors. The primary data collection instrument, the Residential Carpentry Physical Strain Survey, was developed by investigators at Colorado State University (CSU) for evaluation of LBP risk factors among residential carpenters. The instrument was developed in English and translated into Spanish, then back-translated to ensure the validity of the translated version. Potential study subjects were contacted at their work site, informed of the nature of the project, and completed informed consent forms before the survey was administered. The protocol was approved by CSU’s Human Research Committee (the campus institutional review board).

Survey data were managed and analyzed using SPSS and SAS[AQ1]. Proportions were calculated to determine the prevalence rates of LBP within groups. Data were analyzed to explore relationships between variables using descriptive statistics and chi-square tests for homogeneity of proportions. Specific interest was focused at those differences between Hispanic and Non-Hispanic groups, as well as differences between users and nonusers of chiropractic care within each of the two ethnicities.

RESULTS

Greater than two thirds (72%, $N = 241$) of the study population were Hispanic and the remaining 28% ($N = 94$) were non-Hispanic, predominantly Caucasian. General demographic, work characteristics, and other factors were obtained for the study population. Significant demographic and personal differences were noted between the non-Hispanic and Hispanic ethnic groups (Table 1). Of the 20 variables measured, statistically significant ($p < 0.05$) differences were noted in 17 areas. Non-Hispanic carpenters were older, taller, heavier, had attained higher education and incomes, and had worked in residential construction much longer than their Hispanic counterparts.

The point, annual, and lifetime prevalence rates for LBP in non-Hispanics was 14% (95% confidence interval [CI]: 7.0–21.0), 38% (95% CI: 28.2–47.8), and 54% (95% CI: 43.9–64.1) compared to 8% (95% CI: 4.4–11.6), 10% (95% CI: 6.0–14.0), and 19% (95% CI: 13.8–24.2) for Hispanic carpenters (Table 2). A much greater proportion of non-Hispanics (38%) reported suffering continuous LBP compared to only 15% of Hispanic carpenters. Hispanic carpenters differed significantly ($p < 0.01$) from the non-Hispanic counterparts with respect to overall health status, employment by the framing company, and coverage by workers’ compensation insurance (see Table 1).

Overall, 28% of non-Hispanic carpenters sought chiropractic care for LBP whereas only 3% of Hispanic carpenters reported any chiropractic treatment. Investigators found that the non-Hispanic annual prevalence rate was 38%, more than twice the national average. A few select personal characteristics from both groups were highly correlated to chiropractic care. Hispanic chiropractic patients were more likely to have lower stature, more health problems, and more years in the business whereas non-Hispanic chiropractic patients were more likely to have higher education and income, as well as more health problems and hours on side jobs. A number of LBP-related variables were associated with chiropractic care for both ethnicities. Of the 13 variables evaluated, 6 were significant for Hispanic chiropractic patients, including point and 12-month prevalence of LBP, presence of continuous LBP, type of injury, work relatedness, and types of treatment

Table 1. Comparing personal and workplace characteristics of non-Hispanic vs. Hispanic residential framing carpenters¹

Worker characteristics	Non-Hispanic (%)	Hispanic (%)	<i>p</i> value ²
Gender: Male	100	100	1.00
Older than 25 years	77	48	< 0.01
Primary language: English/Spanish	100	100	< 0.01
Stature greater than 69.13" (average US male)	66	34	< 0.01
Body weight heavier than 173.2 lb (average US male)	59	33	< 0.01
Marital status: Married	50	43	< 0.01
Education level: High school graduate or greater	51	20	< 0.01
Income: \$20K/yr. or more	60	20	< 0.01
Smoking status: Current smokers	44	22	< 0.01
Alcohol consumption: 3–5 drinks/beers week or greater	42	21	< 0.01
Exercise status: Light or moderate weekly exercise	59	50	< 0.01
Health status: "Good" health or better	53	77	0.006
Health problems reported	22	10	< 0.01
Employee status: Employees of framing company	43	70	< 0.01
Subcontractor status: Independently employed	70	29	< 0.01
Residential construction experience: > 5 yr experience	73	25	< 0.01
Framing experience: > 5 yr in framing carpentry	63	23	< 0.01
Working 45 hours per week or more	40	41	0.551
Working side jobs 9–16 hours per month or more	30	20	0.042
Workers' compensation insurance coverage: Yes	59	83	0.082

¹Based upon responses, in general, from N = 94 non-Hispanic and N = 241 Hispanic carpenters.

²Level of significance (*p* value) based on chi-square test for proportions.

sought. The use of chiropractic care among non-Hispanic associated with all categories of LBP prevalence, lost work days, type of injury, days suffered with LBP, work relatedness, level of overall back strain rating for carpentry, types of providers sought, physician treatment, and overall rating of LBP as a problem in carpentry.

Significant differences ($p < 0.05$) were seen between the subgroups of chiropractic patients and nonpatients for both ethnicities (Table 3). Non-Hispanic chiropractic patients varied from their nonpatient counterparts in 15 different areas; the chiropractic patients reported: higher general risk and back strain rating for carpentry, working more hours per month doing side jobs, higher incomes and education level; more health problems; the perception that LBP was due to cumulative activities, suffering more days with LBP in the previous year; more continuous LBP; more lost work days resulting from LBP; more work relatedness of LBP; higher ranking of LBP problem in carpentry; and higher LBP prevalence rates in all categories.

The Hispanic chiropractic patients were significantly ($p < 0.05$) different from their nonpatient cohorts in 14 areas: more experience in framing and construction; greater level of mental and physical exhaustion; shorter stature but heavier body weight and thus higher body mass index (BMI); slightly more health problems such as diabetes; more cumulative versus

single incident–precipitated LBP; more days suffered with LBP; more likely to have continuous LBP; more lost work days because of LBP; and greater point and 12-month prevalence rates of LBP.

DISCUSSION

Although other investigators have studied LBP in various cultures,¹⁰ no studies focusing on racial/cultural differences in LBP in construction were identified. Construction related studies have identified LBP as a major problem.^{3,11–13} Thus this is likely the first published study comparing culturally diverse Hispanic and non-Hispanic chiropractic patients who work in construction.

Although there is a paucity of studies of chiropractic utilization among residential carpenters, there have been studies of the general population that have looked at select social, demographic, and health characteristics of chiropractic patients.^{14–17} The level of chiropractic utilization among non-Hispanic carpenters was nearly 10-fold compared to Hispanic carpenters in this study; however, the disparity between lifetime LBP prevalence was less than 3-fold. Hawk and Long¹⁵ found only 1.1% utilization of chiropractic service among Hispanics compared to 94.7% for Caucasian. Nyiendo and colleagues¹⁶ also reported the large majority, 90.4%, of

Table 2. Comparing low back pain (LBP) prevalence and characteristics of non-Hispanic vs. Hispanic residential framing carpenters¹

Low back pain and injury	Non-Hispanic (%)	Hispanic (%)	p value ²
Point prevalence of LBP (within 2 weeks)	14	8	0.078
Annual prevalence of LBP	38	10	< 0.001
Lifetime prevalence of LBP	54	19	< 0.001
Presence of continuous LBP	32	15	0.002
Lost work days resulting from LBP	35	11	< 0.001
LBP related to repeated activity	31	5	< 0.001
Suffered LBP > 20 days in the past year	15	1	< 0.001
LBP is due to work related activities	59	16	< 0.001
Back strain rated moderate/severe	74	46	< 0.001
Self treated LBP	28	10	< 0.001
Sought chiropractic treatment (DC)	28	3	< 0.001
Sought physician treatment (MD)	18	6	0.003
LBP rated as moderate/severe problem in carpentry	82	64	0.039
Job tasks are related to LBP	92	83	0.062

¹Based upon responses, in general, from N = 94 non-Hispanic and N = 241 Hispanic carpenters.

²Level of significance (p value) based on chi-square test for proportions.

Table 3. Comparisons of chiropractic patients and nonpatients among non-Hispanic and Hispanic framing carpenters

Worker characteristic	Non-Hispanic carpenters			Hispanic carpenters		
	DC patient (%) ¹	Non-DC (%) ²	p value ⁵	DC patient (%) ³	Non-DC (%) ⁴	p value ⁵
Point prevalence low back pain (LBP)	31	8	0.004	33	7	< 0.001
12-month period prevalence LBP	58	30	0.013	57	8	< 0.001
Lifetime prevalence LBP	85	43	< 0.001	43	19	0.105
Presence of continuous LBP	48	31	< 0.001	71	14	< 0.001
Lost work days because of LBP	77	19	< 0.001	33	10	0.077
> 6 days suffered in the past year	42	18	0.002	83	8	< 0.001
LBP related to repeated activity	50	23	0.003	17	5	0.019
LBP is due to work related activities	96	44	< 0.001	83	14	< 0.001
Back strain rated moderate or higher	100	86	0.008	80	76	0.962
LBP rated as moderate/severe problem in carpentry	92	84	0.018	100	65	0.060
Risk in carpentry rated moderate or higher	48	26	0.008	50	37	0.613
Stature greater than 69.13" (average US male)	73	63	0.239	0	24	0.046
Body weight heavier than 173.2 lb (average US male)	77	51	0.779	53	26	0.049
Education level: High school graduate or greater	96	87	0.031	43	19	0.139
Income: \$20K/yr. or greater	100	85	0.017	50	43	0.190
Health problems reported	39	16	0.002	33	9	0.013
Frequently or more physically exhausted	58	42	0.388	83	27	0.003
Frequently or more mentally exhausted	65	49	0.916	50	21	0.016
Residential construction experience: > 5 yr experience	92	70	0.379	86	23	< 0.001
Framing experience: > 5 yr in framing carpentry	80	62	0.382	71	21	< 0.001
Working side jobs 9–16 hours per month or more	54	24	0.011	17	20	0.792

¹Based upon responses, in general, from N = 26 non-Hispanic DC patients.

²Based upon responses, in general, from N = 68 non-Hispanic nonpatients.

³Based upon responses, in general, from N = 7 Hispanic DC patients.

⁴Based upon responses, in general, from N = 234 Hispanic nonpatients.

⁵Level of significance (p value) based on chi-square test for proportions.

their respondents to be white non-Hispanic. This study had a much larger proportion of Hispanics than is present in the general population of the geographic area of the study. The ethnic composition of this study undoubtedly stems from the influx of Hispanic immigrants into Colorado serving the construction boom over the past decade.¹⁸

The levels of chiropractic use and prevalence of LBP were surprisingly high, especially among the non-Hispanic carpenters. Non-Hispanic carpenters seeking chiropractic care composed 28% of the total non-Hispanic sample. This is relatively high considering that chiropractic health care providers serve only 10% of the general population.¹⁵ This disparity may originate from the high prevalence of LBP within residential carpentry and the interest in seeking effective alternative treatment. Only 3% of the Hispanic carpenters sought chiropractic care for LBP, yet this is a larger proportion of Hispanic patients than seen by other investigators.¹⁵ The 14% point prevalence of LBP among non-Hispanic carpenters was 43% greater than the 8% reported for Hispanic carpenters, whereas the 12-month prevalence rate was nearly four times greater, 38% versus 10%, respectively. Consistently, the lifetime prevalence of LBP was nearly threefold greater for non-Hispanic carpenters at 54% versus 19% for Hispanic carpenters. Guo and colleagues^{5,6} reported that the annual prevalence of LBP was estimated at 17% for the general US population, with carpenters at 22.2%, second only to construction laborers at 22.6%. The non-Hispanic subjects in this study were found to have an annual prevalence of 38%, 42% higher than that reported by Guo and colleagues,^{5,6} for which the sample size was considerably larger (30,074). However, Guo and colleagues^{5,6} made no distinction between commercial and residential carpenters. It may be that residential carpenters do have higher rates of LBP than do commercial carpenters. In addition, the average age of carpenters in this study was 35 years with 12 years on the job, which may represent greater exposure to hazards and risk factors than those surveyed by Guo and his team. Dement and Lipscomb¹¹ examined more than 30,000 workers' compensation claims submitted to a residential construction fund in North Carolina and found higher injury rates for all injuries, as well as back injuries, compared to commercial construction. Additional study is needed to understand the differences between commercial and residential carpenters in relation to work demands, exposures, and health outcomes. It is clear that carpenters are at elevated risk for LBP and have a great need for effective treatment; in response, they do seek chiropractic services at frequencies above those reported by other investigators.

The Hispanic LBP prevalence rates found in this study are lower than expected. One explanation for this finding may be simply underreporting. Hispanic workers may be influenced by a perceived threat of retaliation from supervisor, construction's "machismo culture," or legal status—each of

these factors would tend to bias findings toward the null. The difference between ethnicities and treatment groups to nontreatment groups was highly significant in many areas. The anthropometry of the two ethnicities is different; for example, the mean stature for Latin Americans was reported at 63.8 inches compared to the mean US non-Hispanic of 69.1 inches.¹⁹ It is interesting that additional differences were noted between the Hispanic chiropractic patients and nonpatients in that Hispanic chiropractic patients tended to have significantly shorter stature, close to the Latin American mean but heavier body weight and thus higher BMIs, which were calculated using English units.²⁰ Hispanic chiropractic patients were, on the average, more than 20 pounds heavier than nonpatients. Conversely, the non-Hispanic chiropractic patients did not vary greatly in stature or weight from their nonpatient counterparts. Overall, the data remain mixed with regard to tallness (stature/height) and body weight and its relatedness to increased LBP.²¹

The Hispanic population of carpenters in general tended to be younger and had much less experience on the job when compared to non-Hispanic carpenters. Job experience was not highly variable among non-Hispanic chiropractic patients but was significantly different among the Hispanic groups. Hispanic patients had nearly twice the number in years in construction and framing carpentry compared to their non-patient carpenters. This may suggest that the higher prevalence of LBP is due to an increased temporal exposure to construction risk factors and thus greater motivation to seek care.

Levels of income and education differed between ethnicities, with non-Hispanic carpenters ranking higher in both areas. In both ethnic groups the chiropractic patients had attained higher levels of education and incomes. Among the Hispanic population, no appreciable differences were seen between chiropractic patients and non-patients. Cote and colleagues¹⁴ found that chiropractic patients tended to have higher levels of education and income; whereas other investigators have not shown this consistency.^{15,16}

In general, health problems were more prevalent among the non-Hispanic group of carpenters; however, they also were older on average by 7 years compared to their Hispanic counterparts. However, among the chiropractic patient groups, Hispanic and non-Hispanic patients reported greater numbers of health problems. Nyiendo and colleagues¹⁶ measured general health status using the SF-12[AQ2] and found chiropractic patient scores were higher (improved) overall compared to nonchiropractic patients. Cote and colleagues¹⁴ found similar results when comparing general health scores between chiropractic-only to medical-only patients in a Canadian population study.

The Hispanic patient population reported significantly ($p < 0.006$) higher mental and physical exhaustion, whereas no significant differences were seen among non-Hispanic pa-

tients although the same pattern existed. Interestingly, these findings are opposite to those reported by both Nyiendo and colleagues¹⁶ and Cote and colleagues,¹⁴ who looked at predominately non-Hispanic subjects. Both researchers found healthier mental (emotional/well-being) and physical (vitality/energy) ratings among their chiropractic subjects. Our findings might suggest that chiropractic patients in construction are more mentally and physically stressed. For Hispanic carpenters, it is certainly plausible that working in a foreign country and culture, speaking Spanish in an English-dominant society, and working in a highly physically stressful environmental might have higher mental and physical stress scores compared to those who are culturally and language matched.

In general, the non-Hispanic carpenters suffered more lost work days from LBP than did Hispanic carpenters. The comparisons of DC users and nonusers found that the non-Hispanic chiropractic-treated group lost significantly ($p < 0.001$) more days from work because of LBP compared to their nonpatient counterparts. No significant difference was seen between the Hispanic subgroups; however, similar findings were observed. Bergemann and Cichoke²² found fewer lost work days for chiropractic-treated patients compared to those medically treated for LBP. Our study did not compare lost work days between those treated for LBP by other disciplines or modalities.

Respondents were asked to rate overall risk and back strain for their trade; both ethnic groups ranked perceived risk in carpentry as moderate. However, among the non-Hispanic subgroups, the ranking of risk was moderate to severe for the chiropractic patients. Both subgroups of chiropractic patients rated the risk higher than their nonpatient counterparts. The overall back strain rating was significantly higher for non-Hispanic carpenters compared to Hispanics. Among the non-Hispanic chiropractic patients, back strain was significantly higher than their nonpatient counterparts. The non-Hispanic carpenters rated their perception of overall back strain in carpentry as moderate to severe compared to the lower rating by Hispanic carpenters. The Hispanic subgroups did not vary greatly on perceptual ratings of risk or back strain. This may be related to machismo culture, lack of conceptual understanding, or poor communication within the survey.

This study has a number of limitations. Although the overall sample size of the study provided sufficient statistical power (85% at the 5% level of significance) to evaluate risk factors for LBP among framing carpenters, several subgroups were small in number, particularly Hispanic carpenters who sought chiropractic care. The survey instrument was designed at a fifth-grade reading level to accommodate an elementary level education and was translated into Spanish followed by back-translation into English to increase accuracy and respondent understanding. Surveys were administered with the same

level of instruction for both ethnic groups, yet Spanish speakers often took two to three times longer to complete the survey. Despite the effort to provide a fully bilingual survey and instruction, some concepts may not have been communicated as effectively in Spanish, thus biasing information reported from Spanish-speaking carpenters. The definition of LBP was stated as that which caused someone to "alter some aspect of normal living or seek care." There was no effort to discern a diagnosis or clinical cause of LBP. This simplistic definition might have resulted in some bias if there are cultural differences in the interpretation of LBP. The findings have the possibility of being affected by selection bias in that construction work is very demanding and worker self-selection is present. A survivor bias may have also affected the study findings. Those who have left construction work because of LBP would not have been sampled, thus biasing effect estimates toward the null. No effort was made to define health care practitioners or disciplines within the survey, although specific clinical disciplines were provided as response categories on the questionnaires (such as chiropractic, medical, physical therapy, massage). If subjects did not understand the terms, this could have resulted in either under- or overreporting.

CONCLUSIONS

This study adds to the literature available classifying types of individuals who seek different types of health care providers, including doctors of chiropractic. Moreover, it appears that many construction carpenters seek chiropractic care far above what was anticipated. A surprising 28% of non-Hispanic carpenters sought chiropractic services for their LBP. This study also found a lower level of chiropractic use among the Hispanic population in comparison to non-Hispanics. Although only 3% of Hispanic carpenters sought chiropractic services, this was nearly three times that reported in previous studies.¹⁵ Additional studies investigating chiropractic care among specialty populations such as construction carpenters are needed. Much more needs to be learned about these subpopulation characteristics and their health needs. Further investigation needs to be carried out to better understand the barriers that keep minorities and the underserved from seeking chiropractic services. Many differences were seen between ethnicities and subgroups of patients versus nonpatients. It is not clear whether many of those differences are due to the individual, workplace environment and organization, culture, or health endpoint being studied. The lack of comparable studies makes it difficult to fully assess the meaning of many of these differences.

Based upon the findings in this study, a higher-than-average LBP prevalence does exist within the residential carpentry trade. Our findings indicated that 38% of non-Hispanic residential carpenters had significant episodes of LBP in the

previous year. This population is at risk for LBP far above the general population. More investigation needs to be carried out looking at risk factors, health endpoints, and treatment options in construction workers, as well as separating out those employed within commercial versus residential and specialty trades. Effective treatment access is desirable in reducing economic and human effects of LBP to society. Cost-effective treatment of LBP can minimize the burden for those suffering, as well as for individual businesses and insurance companies, thus favoring the greater goals of patient intervention, resource optimization, and wellness.

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