

High Prevalence of Back Pain at Free Clinics in the Sacred Valley of Peru

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Abstract

Back pain is a major contributor to healthcare costs around the world and mainly affects manual laborers. Therefore, back pain may be highly prevalent in areas of the world with economies primarily based on physical labor, such as the Peruvian Andes. In the following study, the authors present data from a short-term medical mission to the Sacred Valley region of Peru, during which 1,114 patients over the age of 18 years old were treated. Back pain was identified as the most common health complaint, with 30% of patients presenting with this symptom. In performing logistic regression analysis, both age (OR 1.01 per year over 18) and remoteness of home village (OR 2.42) were associated with the complaint of back pain. Male sex also had a positive association (OR 1.32) and trended toward significance ($p=0.07$). Back pain is a major burden on the health and economy of this region and a potential target for medical intervention.

Introduction

Back pain is a major contributor to disability, health care costs and economic burdens around the world, and affects both industrialized and developing countries.^{1,2,3,4} A 2008 meta-analysis on back pain in the United States indicated that between \$12-90 billion annually in direct healthcare costs, with an additional \$7-28 billion for indirect costs, are allocated to treatment for back pain.⁵ Although a multitude of risk factors for back pain have been proposed in the literature, certain ones have consistently been identified, including increasing age, lower socioeconomic status, lower education level and occupations requiring repetitive bending, lifting and twisting.^{1,2,6,7} The current recommended interventions for back pain include ice, stretching, education on proper lifting mechanics and physical therapy with safe back-strengthening exercises.⁷ Non-steroidal anti-inflammatory medications are also commonly used. However, in impoverished and remote regions around the world, such interventions are not routinely implemented, perhaps due to a lack of trained personnel, a dearth of research on prevalence in the area or limited resources.

While back pain has notable economic ramifications in wealthy countries, such as decreased labor productivity and increased healthcare costs, this burden may be even more pronounced in developing countries with fewer economic resources. Furthermore,

rural areas in these developing countries are even more dependent on manual labor. These areas may experience a greater burden of back pain that remains unrecognized and untreated due to limitations of resources for intervention.⁸

Efforts have been made within these countries and by outside organizations to identify and provide aid to populations at high risk for developing back pain. For example, in 2012, Foltran et al. proposed that the implementation of educational interventions in developing countries, such as the teaching of proper lifting techniques and effective stretching regimens, could lead to a decreased incidence of back injuries.⁹ Implementing such programs could ease the health and economic burdens that individuals carry in these communities. Secondary goals would include lowering the indirect costs associated with back pain, such as loss of work and incurred disability. In order to direct strategic interventions, areas at high-risk must be identified along with the risk factors specific to back pain that would be amenable to interventions.¹⁰

Unfortunately, a great majority of the literature on the epidemiology of low back pain has been restricted to high-income countries, perhaps because of the less robust research infrastructure and fewer financial resources in low-income countries. In wealthy countries, these studies often focus on occupations that involve prolonged, inappropriate posture or repetitive bending

and twisting with lower weights (e.g., workers in technical, sales, clerical, service or transportation occupations).¹¹ It is uncertain whether these findings will fully translate to developing regions around the world, which utilize different tools, techniques and body mechanics (Picture 1 and 2). The scarcity of back pain research complicates the development of effective interventions in low-income countries.⁴

The following study describes the epidemiologic findings of the Peru Health Outreach Project, a medical student-managed project of Case Western Reserve University School of Medicine and the Cleveland Clinic Lerner College of Medicine. This project conducts voluntary, short-term medical missions to urban and remote villages in the Sacred Valley region of the Peruvian Andes. In this study, our medical team collected health and demographic information while also providing medical care to impoverished villages. During the medical mission of 2012, the authors identified an overwhelming burden of back pain in adult patients who presented to clinics. As a result, the authors organized this study of collected data to determine the prevalence of back pain in the region and to identify associated risk factors.

Methods

From June 5 to June 29, 2012, a team of 70 medical professionals and students set up temporary medical clinics in villages across the Sacred Valley region of the Peruvian Andes. A total of 20 clinics were created at 16 different sites in the Urubamba, Lamay, Coya, Calca and Pisac districts, with ten of the sites in high mountain villages surrounding the valley. Patients of all ages, backgrounds and disabilities were accepted at the clinics. Local health authorities affiliated with the Peruvian Health Ministry assisted with the planning and implementation of the mission. All medical professionals received training in clinical operations, documentation, cultural competency and medical Spanish in advance of the trip. Additionally, translators were provided to translate from Quechua (the native language in the area) to Spanish when necessary.

These temporary clinics provided free, basic primary care services and served to supplement the work of local physicians who did not have the staff or resources to provide sufficient healthcare in the distant villages. Patients seen in the clinic who were found to have chronic diseases were referred to local physicians for periodic follow-up. The free clinics also provided additional services including an on-site pharmacy with free basic medications, eye screenings and free glasses, shoes, fluoridations and toothbrushes for children, as well as health education seminars for all patients (Figure 1).

Team members collected patient information using a standard encounter form that captured demographic and health information. Patients were required to have the form completed prior to leaving the clinic. During medical interviews, volunteers asked patients open-ended questions about their health concerns; for example, patients were not asked if they had back pain, only what symptoms they wanted to discuss. All reported symptoms were recorded on the intake form. These forms were subsequently entered manually into a password secured digital database (Access 2010, Microsoft Corp.). For quality assurance, forms were checked for accuracy by the pharmacy team before dispensing medications and spot-checked by the investigators once entered into the digital database.

In this study, data was analyzed only from individuals aged 18 years or older. This cutoff age was selected because it represents the Peruvian age of suffrage and “Age of Majority”¹²—the age at which an individual enters adulthood. It indicates the age by which a great majority of Peruvians have finished school and entered the workforce



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full-time.

The names of patients' home villages were recorded and later dichotomized to either a “Mountain” or “Valley” village. Those villages within the Sacred Valley proper or those in the vicinity of Urubamba, Calca, Coya, Pisac or Cusco were labeled as “Valley”; all others were labeled as “Mountain.” This distinction was made because mountain villages in this region are more remote and agricultural than the valley villages. Individuals from these mountain villages were proportionately more likely to be involved in field labor, usually including planting and harvesting crops, and shepherding animals. In the provinces of Calca and Urubamba, which encompass most of the Sacred Valley, agricultural and untrained laborers represented 78% and 34% of the workforce in rural and urban areas, respectively.¹³ Individuals residing in the mountain villages were also more likely to adhere to the lifestyle and traditions of their Incan heritage. This included traditional farming practices (Picture 2) as well as a culturally ritualistic understanding of medicine. Furthermore, the valley is significantly more industrialized, and residents will often have access to a community health center within their town, whereas patients in mountain villages often face a several-hour journey to reach an established medical facility.

During our clinics, whether held in mountain or valley villages, patients with musculoskeletal back pain were taught proper lifting techniques and back-strengthening exercises by physical therapists or other healthcare professionals. For example, patients were taught to lift heavy loads with an upright back, exerting force through their thighs to avoid stress on the back. Furthermore, patients were taught to carry heavy objects with an upright spine to avoid the common practice of slinging objects over an arched spine (Picture 1). Additionally, patients with back pain were educated on exercises that stretch and strengthen the core muscles and support back health. Effort was made to use culturally acceptable exercises that were easy to perform. For example, we avoided exercises with positions that were deemed indecent to locals, as well as those which would have required the patient to lie on the dirt floors. Protocols were established for the transportation of pa-

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tients with severe or emergent conditions, including back pain with neurological compromise (paralysis, saddle anesthesia, incontinence, etc.), to more advanced care at the closest hospital with specialist and surgical support in Cuzco, Peru.

At the completion of the 2012 mission trip, patient data from the clinics was compiled and analyzed. Using binomial logistic regression,¹⁴ associations among variables of interest and back pain were determined and reported as odds ratios, or the odds of back pain being present in one group compared to another. The regression model was formed using a forward stepwise method including mandatory variables of age and gender. Other variables tested included weight, height, years since last medical visit and mountain or valley residence.¹¹ Variables reaching a p-value less than 0.05 were kept in the model. Interaction variables were also evaluated for the individual variables that were found to be significant. The model was assessed for Goodness of Fit using the Hosmer-Lemeshow test. Ninety-five percent confidence intervals were included. Statistical analysis was performed using the SPSS Modeler (IBM Corp.).

Results

A total of 2,298 encounter forms were created. From this sample, 1,114 subjects aged 18 years and older were included in the study. Their demographic information, divided up by area of residence, is shown in Table 1 (available online). The study sample contained 503 patients residing in mountain villages and 611 residing in valley villages. Overall, most of the patients were female (73%). Patients had a mean age of 47 years and a range of 18 to 98 years.

The majority of the subjects had encountered a medical professional in the past; only 11% of patients had never received professional medical care in their lifetimes. 23% of subjects used medical clinics, whereas 20% reported using traditional home remedies as their primary source of medical care. Of presenting complaints (Figure 2), the most common complaint of adult patients was back pain (30%). Other common complaints included joint pain other than back pain (29%), vision difficulties (27%), abdominal pain (20%) and acute or chronic headache (15%). Patients reporting back pain were an average age of 49.5 years (SD=17.1 yrs) (Figure 3). Back pain was reported in 23%, 35% and 33% of individuals aged 18-39, 40-59 and 60+ years, respectively. 60% of those complaining of back pain lived in mountain villages. Patients reporting back pain also reported pain in another joint in 53% of cases.

A logistic regression (Table 2, available online) was performed to determine which variables were associated with back pain. The variables tested included age, gender, residence in a mountain village, weight and time since last medical encounter. After stepwise develop-

ment of the model, only advancing age and residence in a mountain village were determined to be significant risk factors. The odds ratio for age was 1.01, which corresponds to increased odds of back pain of 1% per year of life. The odds ratio for residence in a mountain village was 2.42 compared to the valley villages, indicating a 2.4-fold increase in the odds that a patient from a mountain village will present with back pain compared to a patient from the valley, assuming all other variables are held constant. The interaction between age and mountain residence was not found to be significant. Additionally, gender was marginally significant with $p=0.07$ and an odds ratio comparing males to females of 1.32 representing an increased risk for males. Performing the Hosmer-Lemeshow Goodness of Fit test for the final model had a chi-square value of 8.6 ($p=0.37$), indicating reasonable model fit.

Discussion

During this short-term medical mission in the Sacred Valley region of Peru, we encountered a high burden of back pain among our patients, with 30% of adults presenting with back pain as a health complaint. We also observed that 29% of patients complained of joint pain other than their backs and 27% had vision problems. In this study we focused on back pain, as it has been clearly described in the literature as a major source of disability and, in most cases, can be prevented or treated without a need for major medical interventions. Joint pain, on the other hand, can include a range of disorders from osteoarthritis to ligamentous sprains and is often the result of a permanent internal derangement. As such, joint pain often requires more advanced treatments or surgeries that are difficult to implement in remote regions. Back pain, on the contrary, is most commonly the result of muscular strain or disc herniation, both of which can be treated with physical therapy and prevented with proper lifting techniques.

Upon further analysis of our data, we determined that the home environment of our subjects was the strongest indicator of back pain. Living in the mountain villages surrounding the Sacred Valley increased the odds of presenting with back pain by nearly two-and-a-half times when compared to living in valley villages. This relationship is likely related to the disparate societal structures in these two areas. While the Sacred Valley as a whole is a rural region, the valley villages (i.e., Urubamba, Lamay, Calca, Coya and Pisac) tend to be more densely populated and support a greater variety of occupations than those situated higher in the mountains, such as taxi driving, custodial work and working in merchant shops. The increased variety of occupations in the valley villages decreases the overall percentage of the population that performed labor-intensive occupations and likely helps to decrease the prevalence of back pain when compared to mountain villages. Additionally, the valley villages were home to local health posts, thus providing more readily available access to the healthcare system.

In smaller mountain villages, almost all inhabitants labored in the fields planting and harvesting crops, shepherding animals and performing activities that have routinely been associated with developing back pain.¹³ In addition, the mountain villages were much more remote than the valley villages, sometimes requiring two or more hours of bus travel, if available, from the nearest valley village to reach health posts. Limited income and limited access to transportation further inhibited those residing in mountainous communities from accessing healthcare.

In addition to place of residence, age was found to be associated with back pain. The logistic model shows that the odds of reporting back pain increase 1% for every year of life in individuals that are greater than 18 years of age. This relationship between age and back pain has been reported elsewhere^{6,11} with similar associations. Interestingly, we did not see the decreased prevalence of back pain in older patients as was suggested by Hurwitz and Morgenstern (1997) (Figure 3), possibly due to the low socioeconomic status of our population, which often necessitates that individuals labor well into their elderly years. It was not uncommon to see men and women working in the fields well into their sixties and seventies, carrying heavy loads on their backs for hours at a time.

While these data are compelling, it should be noted that the primary goal of this medical mission was to provide healthcare and

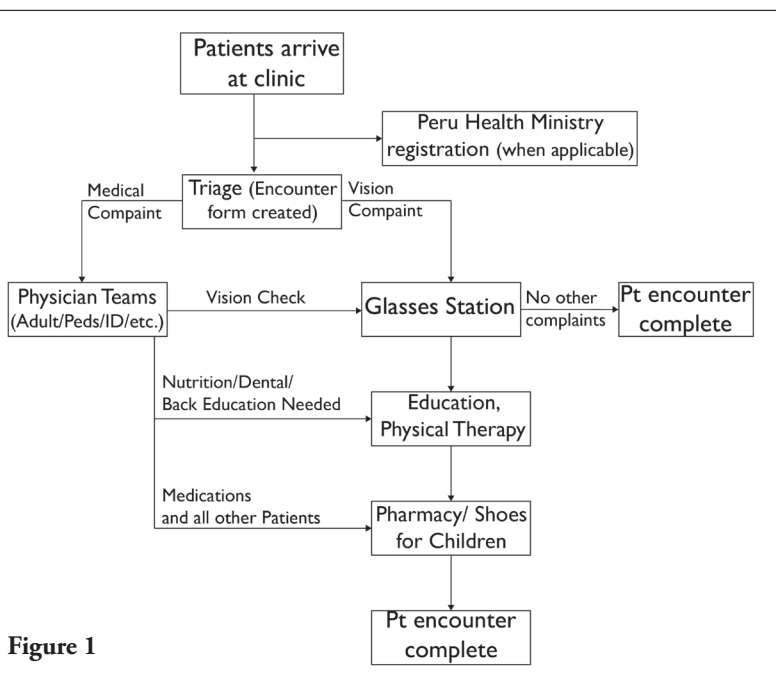


Figure 1

education to an underserved population. This back pain study grew out of the high proportion of patients who reported back pain in our clinics. As a result, there are notable limitations in this study. The data presented are the result of a cross-sectional survey of patients who attended a free clinic, so proportions of disease that we observed may not perfectly reflect disease burden in the region. A 2007 census of the area indicates that approximately 51,000 individuals live in the region. We collected data on 2,300 men, women, and children—about 5% of the region's population.¹³

In the clinics, we saw more female than male patients. While the exact reason for the female predominance is unknown, we speculate that more women attended the clinic because they often brought in children or grandchildren to be seen. The majority of men said they were coming in from the fields, and thus we further speculate that a large percentage of men were unable to leave their duties to attend our clinic. As such, we may have missed identifying men who were experiencing back pain but were not present at the clinics, leading to a potential underestimation of back pain in men of the area. Likewise, it is possible that the men did not present to the clinic because they did not experience any back pain. However, considering that the male gender was approaching significance ($p=0.07$) as a risk factor, we believe that our results are more likely to be an underestimation of the true burden of back pain in this region. Additionally, some patients may not have listed back pain as a problem because they had more pressing symptoms or because they had become resigned to their back pain as an irremediable part of their lives.

It is also notable that we did not collect data on specific locations of back pain (i.e. upper, middle or lower back pain) in order to simplify data collection. Neck pain was considered separately. Diagnosis was made through a detailed history and physical examination with assessment for "Red Flags." Diagnosis of back pain was made clinically in the same manner that it is diagnosed in the average primary care clinic.¹⁵ Lastly, the data estimate the prevalence of back pain in this region, rather than the incidence. Prevalence describes current burden of disease, whereas incidence measures onset of new disease. Therefore, we cannot comment on the risk of developing back pain in these communities but can only speak to its high burden at the time of the study. Regardless of these limitations, our data show that back pain, joint pain and visual deficiencies are the most common complaints of patients from this region and should be understood as major burdens to the health status of this region of Peru. The high prevalence of back pain identified in this study of the Sacred Valley is comparable to studies in other regions around the world predominantly dependent on physical labor, such as Taiwanese workers (25.7%), Irish farmers (27%) and Chinese farmers (38.5%).^{16,17,18} While data on disease severity and impact on quality of life were not collected in our study, a portion of patients anecdotally expressed that back pain had limited their ability to work and had negatively impacted their lives. These patients described a decrease in productivity and income related to back pain, and, in severe cases, families suffered financial uncertainty because the breadwinner was unable to work due to severe back pain. These findings adhere to those of many other studies conducted in developed countries, where lost wages were a significant, if not the largest, cost associated with back pain.⁵ In such remote areas, a disabled, unskilled worker has few options to provide food and shelter for his or her family if he or she cannot perform physical labor. This difficulty highlights the significance of the problem and the importance of addressing back pain in remote regions.

By identifying back pain as a highly prevalent health complaint in the Sacred Valley, this study highlights the need for future healthcare missions and local governments to implement interventions to address this burden. The potential value of such interventions is supported by studies showing that, depending on the chronicity and etiology of the back pain, many patients can recover from back pain without residual disability.¹⁹ Also, back pain can potentially be prevented with education on healthy lifting and stretching practices or reversed with appropriate physical therapy. These interventions have fewer barriers to implementation than the technologically advanced interventions required for many other diseases. As such, the potential

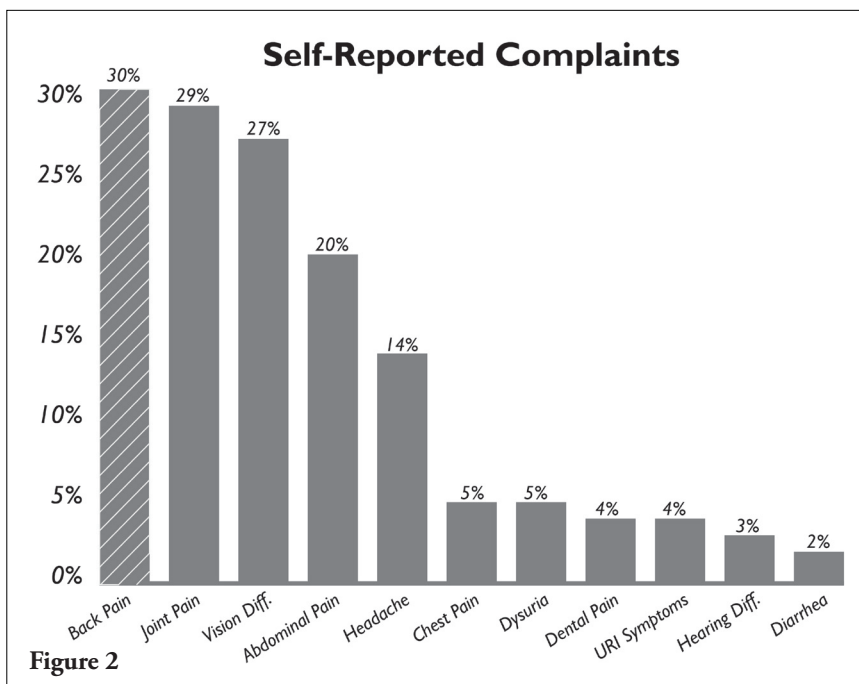


Figure 2

for a practical, sustainable and effective solution to the high burden of back pain in this region remains realistic. However, disseminating the idea that back pain is treatable and preventable is an important first step forward in helping debilitated patients around the world.

Many, if not all, patients in the clinic had never received back care education before, and many believed that back pain was a permanent part of their lives that could not be treated or prevented. Our patients in the Sacred Valley received a short, practical physical therapy lesson at the conclusion of their visit to the clinic. This session lasted for approximately ten minutes and was integrated into the flow of the clinic (Figure 1). Assessing the effectiveness of this training will be difficult but could be accomplished

by surveying adults seen at schools we visit on a yearly basis. A larger goal would be to assist local authorities in developing educational programs in schools to provide education for children before they enter the work force. We believe such an intervention has a strong likelihood of benefitting this region because of the interest shown by patients during teaching sessions at our clinics, as well as successes of educational interventions in other regions of the world. For example, an educational intervention for Brazilian school children showed

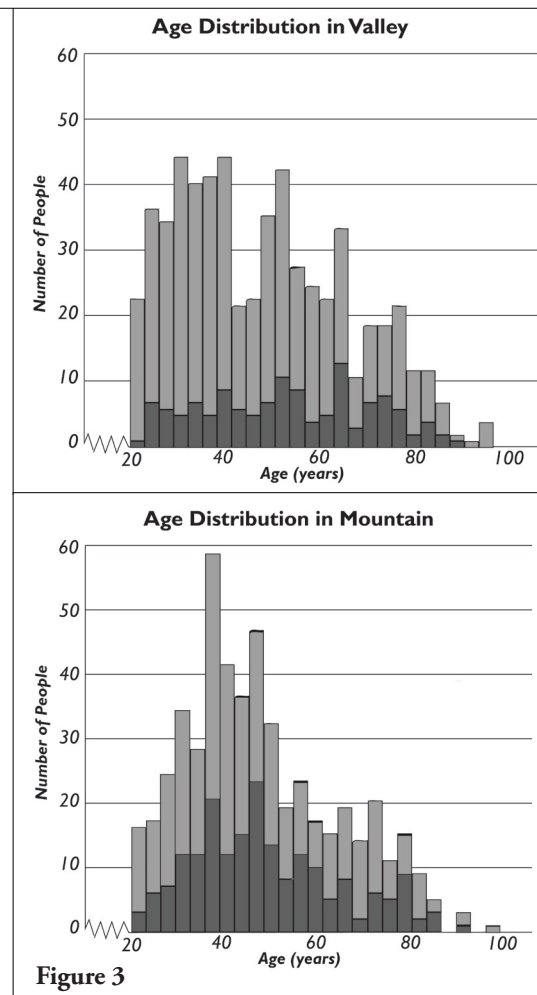


Figure 3

retention of ergonomic principles two years after the completion of the intervention.⁹ Likewise, implementation of “Back School” in an Iranian pharmaceutical company led to a significant decrease in the level of back pain after three months.²⁰ Future studies are needed to determine whether such interventions can be successfully implemented in remote regions with potential cultural barriers.

Apart from the struggle of individuals and families, chronic back pain likely has negative effects on the economy of the region as a whole by decreasing the productivity of workers and increasing the burden on the healthcare system (in regions where individuals have sufficient access to healthcare). While medical personnel in the Cusco North Health Network have made great strides in improving healthcare in the region, these initiatives have largely focused on improving maternal and pediatric health. As a result of these public health interventions, this region of Peru has seen improvements in child vaccinations and maternal mortality rates,²¹ showing the potential of such initiatives; however, there is much work to be done to confront the ever-present challenge of back pain.

We believe that simple, persistent interventions in education relating to back exercises and proper lifting techniques, disseminated by medical missions and local governmental agencies, could lead to a significant decrease in the burden of back pain in this region. Furthermore, we believe that this education should begin early in the classroom to provide a stronger foundation for children before they leave school to work in the fields. Such an intervention could be modeled after successful programs like the Spanish “Postural Education Program.”²² In this program, grade school children were taught proper lifting and stretching techniques, as well as proper posture for carrying a backpack. After revising this program to specifically tackle the most pertinent local obstacles to back health, such an effectively targeted intervention could lead to a decrease in the burden of back pain in the Sacred Valley.

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