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BRIEF REPORT

Self-Reported Musculoskeletal Pain in Latino Vineyard Workers

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ABSTRACT. The agricultural economy in the United States is dependent on millions of Latino migratory workers. Despite the health risks associated with this line of work, many agricultural workers lack health insurance or access to health care services. The purpose of this study was to collect demographic data and investigate the musculoskeletal health of Latino migratory vineyard workers. A physical therapy team collected demographic data at health clinics held at vineyards in Oregon. Nearly half (48.4%) of all vineyard workers reported experiencing musculoskeletal symptoms (MSS) in at least one region of the body. The primary region of reported MSS was the back (32% of all men and 43.7% of all women). In most cases, those who reported MSS were significantly older than those who did not report MSS. Future research is necessary to identify personal and work related injury risk factors in order to develop prevention programs.

KEYWORDS. Agriculture, back pain, Latino, musculoskeletal symptoms, occupational epidemiology, vineyard

INTRODUCTION

The agricultural economy in the United States is reliant on the three to five million migratory and/or seasonal farmworkers from Mexico

and other Latin American countries who harvest crops annually.¹⁻⁶ Agricultural workers risk musculoskeletal injury, exposure to pesticide poisoning, and death in what is considered to be one of the most hazardous occupations in the

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United States.⁷⁻¹² This line of work is physically demanding, frequently paying workers minimum wage and providing no fringe benefits.⁸ Despite the health risks associated with this line of work, upwards of 70% of farm workers lack health insurance benefits.^{8-11,13}

Migratory and seasonal vineyard workers, regardless of immigration status, traditionally lack access to health care services.^{14,15} If a Latino migratory vineyard worker is injured, he or she may face several barriers to accessing health care.^{8,16-19} As previously mentioned, many lack health insurance and may lack money to pay directly for health care services.^{14,16-18} Some (those who have not established legal residency) will avoid seeking medical treatment out of a fear that they might be deported.^{14,17,18,20} Additionally, there is a cultural trend among some Latinos to self-treat and to only seek medical care if a condition worsens.²¹⁻²³ If a Latino either chooses to or is forced to seek health care services, he/she may face a lack of available clinical services, be unable to communicate due to a lack of available interpreter services, or may have difficulty negotiating the American health care system.^{14,16-19} An inability to access health care services may lead to an increase in morbidity and mortality. In addition, from a public health perspective, a failure to address health care needs may increase the transmission of communicable diseases and contribute to the escalation of potentially unnecessary health care costs.¹⁶

The agricultural economy in the state of Oregon is similar to that of the rest of the United States; reliant on the nearly 100,000 migratory and seasonal farmworkers to plant and harvest crops each year (Oregon ranks second to California for total variety of crops and commodities produced).²⁴ One crop requiring significant labor resources is the planting and harvesting of grapes for wine. Oregon has the third most wineries in the United States, with Latino farmworkers making up the majority of the agricultural workers harvesting Oregon grapes.²⁵

To address the health care needs of some vineyard workers in Oregon, winemakers and health care providers created the ¡Salud! program.²⁶ Members of the ¡Salud! team

(Tuality Healthcare, Hillsboro, Oregon) and volunteer health care professionals from Pacific University (Hillsboro, Oregon) provide on-site health screening clinics each year at vineyards throughout the northern Willamette Valley in Oregon. Services provided at these clinics include health care screening (cholesterol, diabetes, blood pressure, height, weight, and body mass index), vaccinations, optometric examinations, dental health services, mental health services, and health education.²⁶ Pacific University's School of Physical Therapy volunteered services to ¡Salud! for the first time during the 2009 summer season. Physical therapists are health care professionals who perform musculoskeletal examinations to identify individuals who may be at risk of injury or to identify dysfunction and impairments in individuals who present with musculoskeletal pathology. Due to the physical demands of vineyard work, a worker may experience MSS or may be at risk for a variety of musculoskeletal injuries.²⁷ Meyers et al.²⁷ identified that vineyard workers may risk back and the upper extremity injury during occupational tasks such as harvesting, pruning, and shovel weeding due to the postural demands and repetitive performance associated with these activities.²⁷

Physical therapists and graduate students in the physical therapy program performed musculoskeletal screening examinations and provided treatment in the form of exercise prescription, ergonomic education (proper lifting mechanics), and/or manual therapy techniques when indicated. In addition, referrals to medical providers were generated when warranted.

There is a paucity of information in the literature regarding demographic data or musculoskeletal injury epidemiology in migratory vineyard workers despite the reported size of the population. The purpose of this initial pilot retrospective assessment was to report demographic data and identify self-reported musculoskeletal symptoms in Latino vineyard workers.

METHODS

This investigation was approved by Pacific University's (Hillsboro, Oregon, United States)

Institutional Review Board. Demographic data and musculoskeletal symptom reports were collected from participating Latino vineyard workers at each of the on-site health screening clinics. Data were collected from May 2009 through August 2009.

The on-site health screening clinics are a collaborative effort between the health care providers and the participating vineyards. For almost two decades, the ¡Salud! program has been providing health care assessments and services to migratory workers and their families. The active involvement of the stakeholders has helped to facilitate the growth of the program and the ability of the vineyard workers to obtain the services. The employees of the vineyards are encouraged to participate and are frequently allowed paid time off from work to participate in the clinics.

Upon arrival to the clinic, a worker would complete a health care intake form for the ¡Salud! program. Once the paperwork is completed, he/she would rotate amongst the available health care providers. There were usually two or more health care providers (e.g., physical therapy, dental health, etc.) at each clinic. Participation with each health care provider group was encouraged. To assist progression from one station to another, each worker was provided with a checklist that was initialed by a provider upon completion of activities at that station.

The goal of the physical therapy team was to identify if an individual was experiencing musculoskeletal symptoms (e.g., pain, soreness, etc.) and to intervene as appropriate. Prior to performing an assessment, each individual was greeted by a faculty member and informed as to the purpose (e.g., assess musculoskeletal symptoms, address with interventions, and refer to other providers as necessary) of physical therapy at these worksite clinics. An individual's age, gender, and musculoskeletal symptom reports were collected prior to one receiving a physical therapy examination and, when warranted, treatment. To identify one's current perceived state of musculoskeletal health, each worker was asked a similar set of questions by a university faculty member. These questions included:

1. Are you currently experiencing muscle and/or joint pain or soreness?
2. If so, where? If one reported experiencing musculoskeletal symptoms, the body region or regions were recorded. For the purposes of this investigation, the body was classified into the following regions: neck, back (thoracic, lumbar, and sacrum), shoulders, elbow, wrist and hand, hips, knees, leg, and the foot and ankle. Extremity joints were further classified by the side of the body injured (right or left).
3. How long have you been experiencing this pain and/or soreness?
4. What is the cause of this pain and/or soreness?

These questions, which provided information regarding current MSS, are traditionally asked as part of a standard physical therapy assessment. Follow-up questions were asked dependent on the worker's response. If an individual was unable to speak or comprehend English, the interview was conducted in Spanish by a member of the ¡Salud! team or by a faculty member who was fluent in Spanish.

When an individual reported experiencing MSS, a musculoskeletal examination was performed to identify potential contributing factors. Physical therapists in the state of Oregon are allowed to practice without referral. Treatment was provided if indicated based on the results from the examination. At the completion of the physical therapy session, the worker was directed to the next available health care provider. When deemed appropriate by a faculty member, a referral to a primary provider was generated. A referral form was prepared for the individual noting the purpose for the referral (e.g., chronic pain, rule out potential nonmusculoskeletal pathology) and delivered to one of the ¡Salud! nurses. The community outreach nurse was then responsible for facilitating one's future medical appointments.

Data Analysis

A statistical analysis was performed using SPSS Statistics 17 (Chicago, IL).²⁸ Descriptive statistics were calculated for groups based on

gender, by location of pain, and by the total number of pain reports per individual. The Mann-Whitney test was performed to determine if differences existed between groups within the same gender (those who reported musculoskeletal symptoms and those who did not) based on individual reports and location. No additional statistical adjustments were made based on a lack of additional prognostic indicators. Odds ratios were calculated to estimate the relative risk of injury between age groups.

RESULTS

A total of 287 vineyard workers were assessed by the physical therapy team at 25 vineyard clinics starting in May 2009 and ending in August 2009. Demographic data for male

and female vineyard workers are presented in Table 1. A total of 255 men (mean age 32.73 years, range 18–68 years) and 32 women (mean age 30.97 years, range 18–56 years) were evaluated by the physical therapy team.

Male Vineyard Workers

A total of 115 men (45.1% of the total male population) reported MSS in at least one region of their body (Table 1). Of the 115 men who reported experiencing MSS, 82 (32%) reported experiencing MSS in the back, 33 (12.9%) reported MSS in a region of the body other than the back, and 20 (7.8%) reported MSS in two or more regions of their body (Table 2). Table 3 presents age group comparisons based on MSS reports and location.

TABLE 1. Demographic Data: Male and Female Latino Vineyard Workers

| | Total | Mean age (SD) (years) | Minimum–maximum age (years) |
|---|-------------|--------------------------|--------------------------------|
| All male vineyard workers | 255 (100%) | 32.73 (11.51) | 18–68 |
| Male vineyard workers who denied having MSS | 140 (54.9%) | 30.77 (10.38) | 18–65 |
| Male vineyard workers who reported experiencing MSS | 115 (45.1%) | 35.10 (12.39) | 18–68 |
| All female vineyard workers | 32 (100%) | 30.97 (8.64) | 18–56 |
| Female vineyard workers who denied having MSS | 8 (25%) | 24.63 (5.45) | 18–32 |
| Female vineyard workers who reported MSS | 24 (75%) | 33.08 (8.54) | 21–56 |

TABLE 2. Demographic Data: Male and Female Latino Vineyard Workers' Musculoskeletal Symptom (MSS) Reports

| | Counts (% of total gender population) | Mean age (SD) (years) | Minimum–maximum age (years) |
|--|---|--------------------------|--------------------------------|
| Male vineyard workers who reported MSS in the back (thoracic and lumbar spine) | 82 (32) | 32.98 (10.32) | 18–63 |
| Male vineyard workers who reported MSS (non-back origin) | 33 (12.9) | 40.39 (15.39) | 18–68 |
| Male vineyard workers who reported MSS in one region of the body | 95 (37.2) | 34.62 (11.96) | 18–68 |
| Male vineyard workers who reported MSS in two or more regions of the body | 20 (7.8) | 37.35 (14.46) | 18–67 |
| Female vineyard workers who reported MSS in the back (thoracic and lumbar spine) | 14 (43.7) | 31.14 (8.09) | 21–45 |
| Female vineyard workers who reported MSS (non-back origin) | 10 (31.2) | 35.80 (8.80) | 23–56 |
| Female vineyard workers who reported MSS in one region of the body | 12 (37.5) | 32.92 (10.53) | 21–56 |
| Female vineyard workers who reported MSS in two or more regions of the body | 12 (37.5) | 33.25 (6.44) | 22–45 |

TABLE 3. Age Group Comparisons of Self-Reported Musculoskeletal Symptoms (MSS) by Vineyard Workers

| Age range (years) | Gender | No. reported MSS Total (% of the population) | Self-reported MSS (at least one region) Total (% of population) | Self-reported MSS in the back Total (% of population) | Self-reported MSS (non-back origin) Total (% of population) |
|-------------------|--------|--|--|--|--|
| 29 or less | Male | 77 (30.2) | 42 (16.5) | 31 (12.1) | 11 (4.3) |
| | Female | 7 (21.9) | 8 (25) | 6 (18.8) | 2 (6.0) |
| 30–34 | Male | 17 (6.7) | 26 (10.2) | 24 (9.4) | 2 (0.8) |
| | Female | 1 (3.1) | 7 (21.8) | 5 (15.6) | 2 (6.0) |
| 35–39 | Male | 19 (7.5) | 13 (5.1) | 10 (3.9) | 3 (1.1) |
| | Female | 0 (0) | 5 (15.6) | 1 (3.1) | 4 (12.5) |
| 40–44 | Male | 10 (3.9) | 11 (4.3) | 6 (2.3) | 5 (2.0) |
| | Female | 0 (0) | 1 (3.1) | 0 (0) | 1 (3.1) |
| 45–49 | Male | 10 (3.9) | 6 (2.4) | 3 (1.1) | 3 (1.1) |
| | Female | 0 (0) | 2 (6.0) | 2 (6.0) | 0 (0) |
| 50–54 | Male | 2 (0.8) | 7 (2.7) | 5 (2.0) | 2 (0.8) |
| | Female | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| 55–59 | Male | 4 (1.6) | 3 (1.1) | 1 (0.4) | 2 (0.8) |
| | Female | 0 (0) | 1 (3.1) | 0 (0) | 1 (3.1) |
| 60+ | Male | 1 (0.4) | 7 (2.7) | 2 (0.8) | 5 (2.0) |
| | Female | 0 (0) | 0 (0) | 0 (0) | 0 (0) |
| Total | Male | 140 (55) | 115 (45) | 82 (32) | 33 (13) |
| | Female | 8 (25) | 24 (75) | 14 (43.5) | 10 (30.7) |

TABLE 4. Comparison of Median Age Between Injury Classifications for Male and Female Vineyard Workers

| Category | Number of male subjects | Median age of males (years) | <i>p</i> value | Number of female subjects | Median age females (years) | <i>p</i> value |
|---|----------------------------|--------------------------------|----------------|------------------------------|-------------------------------|----------------|
| No reported MSS | 140 | 28.5 | .00* | 8 | 25.0 | .00* |
| At least one reported region of MSS | 115 | 33.0 | | 24 | 34.0 | |
| No reported MSS | 140 | 28.5 | .04* | 8 | 25.0 | .03* |
| Reported MSS in the back | 82 | 32.0 | | 14 | 32.5 | |
| No reported MSS | 140 | 28.5 | .00* | 8 | 25.0 | .00* |
| Reported MSS (non-back origin) | 33 | 41.0 | | 10 | 35.0 | |
| Reported MSS in the back | 82 | 32.0 | .00* | 14 | 32.5 | .08 |
| Reported MSS (non-back origin) | 33 | 41.0 | | 10 | 35.0 | |
| Reported MSS in one region of the body | 95 | 33.0 | .22 | 12 | 34.0 | .43 |
| Reported more than one region of MSS | 20 | 36.5 | | 12 | 34.0 | |

*Statistically significant.

Men who reported MSS were likely to be older than their symptom-free counterparts (Table 4). In most cases, there was a statistically significant difference in age between male vineyard workers who reported MSS and those who did not. Men who reported no MSS were

significantly younger than those who reported at least one region of MSS ($p = .00$), those who reported MSS in the back ($p = .04$), and those who reported MSS in a region other than the back ($p = .00$). Also of significance, men who reported MSS in the back were statistically

TABLE 5. Risk of Self-Reported Musculoskeletal Symptoms (MSS) in Male Vineyard Workers by Age Group

| Age range (years) | Total (n) per group | Percentage reporting MSS | OR (95% CI) | p value |
|-------------------|------------------------|-----------------------------|------------------|---------|
| 34 or younger | 162 | 42 | Referent | |
| 35 and older | 93 | 51 | 1.4 (.8, 2.4) | .186 |
| 40 and older | 61 | 56 | 1.8 (.9, 3.1) | .056 |
| 45 and older | 40 | 43 | 1.8 (.9, 3.6) | .084 |
| 50 and older | 24 | 71 | 3.29* (1.4, 7.9) | .008 |
| 55 and older | 15 | 67 | 2.57 (.8, 7.4) | .084 |

*Statistically significant.

younger than those who reported MSS in their extremities or neck ($p = .00$). The only relationship in which there was not a significant difference in age was between males who reported one region of MSS versus males who reported MSS in two or more regions of the body ($p = .22$).

An increase in age was also associated with an increased risk of a male reporting MSS. Table 5 presents the odds ratios for male vineyard workers between age groups. Males who were 50 years of age and older were 3.29 times more likely to report MSS ($p = .008$) than their younger counterparts. The other reported relationships were not significant; however, there was a trend towards significance between males who were 40 years of age and older when compared to their younger coworkers ($p = .056$). Older male vineyard workers were likely to report more MSS in their back; however, none of the relationships were significant.

Female Vineyard Workers

A total of 24 women (75%) reported experiencing pain in at least one area of their body (Table 1). Of the 24 women who reported MSS, 14 (43.7%) reported experiencing MSS in the back, 10 (31.2%) reported MSS in a region of the body other than the back, and 12 (37.5%) reported MSS in two or more regions of their body (Table 2). Table 3 presents age group comparisons based on MSS status and location.

Women who reported MSS were also likely to be older than their symptom-free coworkers (Table 4). Women who reported symptoms

in one region of the body ($p = .00$), or who reported back symptoms ($p = .03$), or who reported pain in an area other than the back ($p = .00$) were significantly older than their symptom-free counterparts. Women who reported MSS in the back were younger than those who reported pain in an area other than the back; however, this difference was not significant ($p = .08$).

An increase in age was also associated with an increased risk of a female reporting MSS (Table 6). Females who were 30 years of age and older were 14 times more likely to report MSS ($p = .008$) than their younger counterparts.

Treatments by Body Region

The purpose of the therapeutic interventions provided or prescribed by the physical therapy team were to either immediately impact (decrease) the worker's MSS, and/or provide tools to address musculoskeletal dysfunction, and/or make a referral to another health care provider. Providing treatment to the workers at the vineyard clinics is a different model of care than the delivery of physical therapy in the traditional clinical setting. Education was also a key component to the intervention; informing a worker of what he/she might expect from the provided or prescribed intervention(s) and describing the process of how to follow up with the ¡Salud! team if one's symptoms have not improved by a certain point in time.

The back (the thoracic and lumbar spine) was the primary region of MSS reported by both male and female vineyard workers. In most cases we were able to treat the workers

TABLE 6. Risk of Self-Reported Musculoskeletal Symptoms (MSS) in Female Vineyard Workers by Age Group

| Age range | Total (n) per group | Percentage reporting MSS | OR (95% CI) | p value |
|-------------------|------------------------|-----------------------------|-------------|---------|
| 29 or younger | 15 | 53 | Referent | |
| 30 years or older | 17 | 94 | 14*(2, 98) | .008 |

*Statistically significant.

who reported MSS in the spine with manual therapy techniques and/or with the prescription of therapeutic exercises. Spinal manipulative therapy (SMT) is a form of manual therapy that can safely and effectively decrease one's pain (MSS).²⁹ In some cases, SMT may have immediate effects on reducing pain.²⁹ The decision to perform SMT was based on evidence based practice principles: the best available research evidence, clinical expertise, and a patient's values.^{29,30} Prior to performing a manipulative technique, the procedure was explained in Spanish (or English) and consent was obtained. SMT appeared to be an effective therapeutic intervention with this population. Many workers expressed feeling better immediately after receiving SMT. There were no reported negative side effects from SMT reported by the workers immediately post treatment. Therapeutic exercises were also prescribed to workers' with MSS in the spine. The purpose of these exercises are to improve the muscular endurance of the core (spine stabilizers and hip musculature).^{31,32}

The remainder of all non-back-related MSS (12.9% of all males [$n = 33$] and 37.5% of all females [$n = 10$]) reported by workers included the following regions: the cervical spine, shoulders, hips, thighs, knees, legs, and ankles. In most cases the MSS were likely due to repetitive overuse. Therapeutic exercises were prescribed to address functional weakness or muscular inflexibility.

DISCUSSION

The purpose of this investigation was to gather demographic data and to identify MSS in this population. The majority of vineyard workers assessed in this study were male

(88.9%). This finding was consistent with previously reported gender demographics in Latino farmworkers.³³ Almost one-half of the vineyard workers (48.4%) reported experiencing MSS. The back (the thoracic spine and the lumbar spine regions) was the most frequently reported region that one would experience symptoms (males = 32%, females 43.7% of all MSS). This finding supports Meyers et al.²⁷ ergonomic report on potential risk factors for back injury in vineyard workers. They reported that the back was the primary region of musculoskeletal disorders in vineyard workers.²⁷ Potential risk factors for back injury associated with vineyard work include lifting/carrying heavy loads, maintaining postures for prolonged periods while performing repetitive tasks, tractor driving, bending, and twisting.^{27,34}

In many situations, there was a statistically significant difference between ages in those reporting MSS. Age-related changes in one's musculoskeletal health may either predispose one for injury or affect one's ability to recover from repetitive overuse.³⁵ However, it is important to highlight that both younger males and females reported experiencing MSS (Table 3). If these MSS are not addressed, individuals may risk future pain and/or injury. A migratory worker with a "minor" orthopedic injury, who lacks access to the American health care system, may continue to suffer pain.^{14,36} Failure to address the MSS early may affect work performance and contribute to a worsening of the condition. A further degradation in physical health may be associated with a loss of work (time off of the job or the loss of the job itself) and possibly the need for costly treatments including surgery.^{18,14,16,36}

One weakness of this investigation is the inability to attribute the reported MSS to

the physical demands of the job. A prospective design utilizing quantitative measures and worker diaries chronicling MSS/pain, injury, and time-loss from work would improve the ability to identify occupational injuries. A second limitation to this study was inherent to the nature of the worksite clinics. Our goal as physical therapists was to address any reported MSS. From a qualitative perspective, we can report that many individuals presented with physical signs associated with musculoskeletal dysfunction (e.g., strains, sprains, etc.); however, we are not able to quantify the severity of these injuries. First, none of the reported MSS were preventing the workers from performing their job duties. Second, MSS (or pain) is a symptom based on one's subjective feelings. It is possible that one may have reported that they were experiencing MSS in the spine in order to receive SMT; however, if the physical therapy team had not been present, one may not have reported MSS of the spine. Also, some who were experiencing MSS may have failed to report them due to one or more of the common health care barriers faced by Latinos (see Introduction). A final limitation of this investigation is the lack of use of a standardized list of questionnaires when interviewing the workers. The questions that were asked by the physical therapy team were consistent with those frequently asked as part of a musculoskeletal examination. However, without asking a standardized set of questions, information may have been missed.

Despite the aforementioned weaknesses of the study, there is the potential need of orthopedic medical and rehabilitation services for this population. As can be seen from this pilot retrospective report, there are a large number of Latino migratory vineyard workers who reported MSS and, despite the severity of pain, continued to work. Offering on-site health screening clinics may help to reduce the impact of an injury or help to prevent a future injury. Additional investigations are warranted to identify other risk factors that might impact one's musculoskeletal health. Future research should also be directed toward identifying specific tissues involved with one's MSS (e.g., supraspinatus tendon versus shoulder) or to report specific medical diagnoses and/or movement impairment classifications. In the

field, a physical therapy team may be able to identify specific tissues associated with one's MSS or pain and/or identify movement impairments. Regardless of one's professional license, a health care provider would be limited in their ability to make a specific diagnosis at an on-site clinic. The ability to perform additional tests in a medical clinic affords the primary provider the ability to develop a specific diagnosis. It will be beneficial to follow up with a worker who has been examined by a primary provider. There may be a consistent diagnosis (e.g., herniated disk) or set of diagnoses that will facilitate further injury prevention research.

The authors will be conducting a follow-up investigation the next clinical season. Information including years of employment at a vineyard, preexisting musculoskeletal health history, and personal fitness habits will be collected.

Conclusion

Almost 50% of migratory vineyard workers reported experiencing MSS. The direct cause of an individual's pain could not be identified in this study; however, many workers reported that their pain was associated with the physical demands of their employment. Future investigations are needed to identify potential additional risk factors for MSS followed by prospective injury prevention programs.

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