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Prevalence and Characteristics of Muscle Tightness in Young Adults

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In young adults, muscle sprains and strains leading to muscle tightness are considered short-term and believed to have no ill effects on quality of life. However, recent advances in the science indicate that muscle tightness is an invisible condition that can limit life activities. The objective of this study was to identify the prevalence and characteristics of muscle tightness in young adults. The study used descriptive quantitative design. One hundred individuals aged between 18 and 27 years completed a survey based upon a validated muscle tightness measurement tool. Seventy-two percent of participants reported experiencing muscle tightness that limited their daily living and recreational activities. Fifty-six percent reported experiencing pain with muscle tightness. Women were more likely than men to experience muscle tightness. Awareness, prompt evaluation, and treatment of this condition are key to preventing negative consequences associated with chronic muscle tightness.

Introduction

Young adults are generally healthy and often engage in rigorous physical sports and recreational activities. During these physical activities, sprains and strains inevitably occur, but it is assumed that young people heal quickly and fully recover. However, symptoms of muscle tightness often are invisible and therefore are hidden from nurses and other clinicians. Recent evidence suggests that muscle tightness in adults causes considerable pain and results in life limitations (Bhimani & Anderson, 2017; Bhimani, Gaugler, & Skay, 2017). Although the literature is rich with information about muscle tightness in older adults, our understanding of muscle tightness in young adults is available only in the context of other injuries. A large body of literature exists on disease processes such as sprain, strains, and sports injuries and their management however, an understanding of the symptom of muscle tightness from the perspective of young adults is lacking. This study aimed to determine the prevalence of muscle tightness and to identify the characteristics of muscle tightness in young adults.

Background

Muscle tightness is a symptom that may emerge subsequent to a variety of injuries, such as sprains, strains, falls, accidents, trauma, as well as after some surgical procedures. Incidence and prevalence of muscle tightness are difficult to ascertain. According to the U.S. National Collegiate Athletic Association (NCAA) report, approximately 50% of college football players incur shoulder injuries, with acromioclavicular sprains being the most common (Tummala et al., 2018). Sports activities require players to engage in the motion of kicking, spiking the ball, repetitious movements, and running, which can lead to muscular trauma (Anfal & Dhinu, 2017; Sole et al., 2017).

Gender differences in sports injuries have been reported. As an example, female athletes are more susceptible to injuries like anterior cruciate ligament injury or patellofemoral pain syndrome, whereas male athletes are more prone to shoulder instability and traumatic dislocation (Matzkin & Garvey, 2019). The prevalence of hamstring tightness is greater in females than in males (Thakur & Rose, 2016).

Guy et al. (2016) postulated that musculoskeletal injuries may be associated with attention-deficit/hyperactivity disorder (ADHD). They found that children and adolescents with ADHD and comorbid hypertension, substance use disorders, and thyroid disorders have an increased risk of more than one musculoskeletal injury. Unresolved muscle tightness in one muscle group can affect other areas of the body. For example, Bolívar et al. (2013) noted that muscle tightness in the lower limb can lead to plantar fasciitis. It may also affect body posture and function (Bhimani et al., 2018; Takei et al., 2012). Association between ankle sprain and muscle tightness has also been reported (Okamura et al. 2014).

Based on the type of injury, management of associated muscle tightness typically includes use of ice, heat, rest, and physical therapy (Bhimani & Somar, 2019). Additional modalities to manage muscle tightness include use of foam rollers and chiropractor services

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(Avrahami & Potvin, 2014; Mohr et al., 2014), stretching, ultrasound therapy, and massage (Merriman et al., 2020; Ramos et al., 2017; Yang et al., 2012).

Assessment of muscle tightness is an issue in clinical practice as there is confusion about what constitutes muscle tightness (Bhimani & Somar, 2019). The National Library of Medicine labels it as "muscle tonus," which is a normal physiological state for muscle and therefore does not provide clarity about muscle tightness. Bhimani, Gaugler, and Felts (2020) questioned this vague definition and sought to define it from multidisciplinary perspectives. Using qualitative methodology, they interviewed expert clinicians and from these data identified seven characteristics—some or all of which individuals with muscle tightness may experience: decreased range of motion, loss of function, change in muscle tissue texture, change in sensation, pain, asymmetry/restriction in the body, and contracted muscle state. These seven attributes were further mapped on a screening tool. The screening tool items were validated for content using Lawshe's ratio. The tool has content validity of 0.6, which is considered acceptable (Lawshe, 1975). Because experiences of muscle tightness are partially subjective due to pain and changes in sensations, it is important that any assessment for muscle tightness include the patient's report, such as falls and sleep position. The muscle tightness measurement (MTM) tool is one assessment tool that incorporates patient report. Findings indicated that the MTM tool also has statistically significant ($p < .05$) divergent validity where it discriminated between adult patients with and without muscle tightness (Bhimani et al., 2021).

Pain has been reported to be part of muscle tightness experiences. According to King et al. (2011), 14%–24% of children and adolescents experience musculoskeletal pain. Not all patients with muscle tightness experience pain, but those who do require immediate attention (Bhimani et al., 2018). Pain initially can be managed with rest, ice, and heat; however, it may require use of analgesics and nonsteroidal anti-inflammatory (NSAID) medications (Eccleston et al., 2017). Long-term use of NSAIDs can cause gastrointestinal bleeding and damage kidneys (Bensman, 2020; de Martino et al., 2017). If muscle tightness with pain is not quickly resolved, it may require other modalities such as physical therapy and opioids. Use of opioids is concerning because it can lead to addiction and substance abuse (Groenewald et al., 2018). Therefore, it is important that muscle tightness be evaluated and treated in a timely manner to avoid the ill effects of delayed treatment.

Methods

Purpose

The purpose of this study was to determine the prevalence and to identify the characteristics of muscle tightness in young adults.

Setting and Sample

This study was conducted at a large Midwestern college in the United States. One hundred college students aged 18–27 years were recruited to participate in the study (see Table 1). Inclusion criteria were students enrolled in the college either part-time or full-time. Exclusion criteria were inability to complete questionnaire in one setting. Participants were not prescreened for any conditions including muscle tightness.

Ethical Statement

The Kalamazoo College Institutional Review Board approved this study. The study flyers were posted throughout the college campus. Participants were recruited via posted flyers, announcements in the classes, and college social media. Flyers described the study purpose and listed contact information for the researcher. Students who expressed interest in the study were briefed on the study's purpose and told that participation was voluntary and that they could withdraw from the study at any time. Written consent was then obtained from those who agreed to participate. Participants received a candy bar as an incentive for their participation.

Data Collection and Analysis

This study used a descriptive, observational, quantitative design. Data were collected in person using a paper survey that required 10–15 minutes to complete. The survey collected demographic information (see Table 1) and screened for seven characteristics of muscle tightness: pain, limitation in physical activities, limitation in range of motion, asymmetry/restriction in the body,

Table 1. Participant Demographics ($N = 100$)

Characteristic	n
Age, years	
18–20	38
21–23	61
24–27	1
Sex	
Male	39
Female	59
Transgender	1
Other	1
Ethnicity	
American Indian/Alaska Native	1
Hawaiian/Other Pacific Islander	0
Asian/Asian American	27
Black/African American	4
Hispanic/Latino	3
Non-Hispanic White	59
Other	6
Current school year	
First	7
Second	20
Third	11
Fourth	62

inability to relax muscles, difference in muscle texture, and unusual sensations. Survey questions about muscle tightness (see Table 2) were based on the MTM tool, which has an acceptable validity (Bhimani et al., 2021). In addition, the relationship between muscle tightness and seven characteristics was correlated to determine whether they were significantly related (see Table 3). Questions concerning lack of strength, lack of coordination, and falls were also included in the tool because muscle weakness and muscle tightness often coexist (Bhimani et al., 2021). Participants were asked to rate their level of pain due to muscle tightness on a numeric scale of 0–10, with 0 being "no pain" and 10 being "the worst pain imaginable." The relationship between pain and muscle tightness was further analyzed using cross-tabulation function (see Table 4). They were also asked to identify any factors or strategies that alleviated or worsened their symptoms (see Table 5).

Inferential and descriptive statistics were used for analysis. Inferential statistics included parametric and nonparametric statistics based on the level of measurement. Data were analyzed using SPSS 24 software. A p value of less than .05 was considered significant.

Results

Most participants were female (59%), whereas the remaining comprised 39% male, 1% transgender, and 1% other. The majority of students were non-Hispanic White (59%) and Asian American (27%). See Table 1.

Seventy-two of the 100 participants (72%) reported having muscle tightness, 29% of whom had muscle tightness that had lasted for more than a year. Fifty-six percent of participants with muscle tightness experienced concurrent pain.

Prevalence and Characteristics of Muscle Tightness

Of the 72 participants who reported muscle tightness, 39 (54%) were women, 1 (1%) was "other" (gender), and 32 (44%) were men. Fifty-six (of the 100) participants reported experiencing pain and change in muscle texture due to muscle tightness (see Table 2). Four (pain, limitation of physical activities, asymmetry/restrictions in the body, and inability to relax muscle) of seven characteristics for muscle tightness were statistically significant. However, limitations in range of motion, difference in muscle texture, and unusual sensations such as numbness/tingling were not statistically significant. In addition, muscle weakness was noted to be nonsignificant. Five participants reported falling in the last year, which was statistically significant (see Table 3). It was unknown whether falls were related to muscle tightness as the survey nature of the study did not allow for qualitative evaluations. Interestingly, participants reported sleeping in a certain position due to muscle tightness restrictions in the body, which was statistically significant. Thirty-nine participants experienced muscle tightness in the chest area, but it was not statistically significant (see Tables 2 and 3).

Participants ranked their pain levels due to muscle tightness using a numeric rating scale. Statistical analysis indicated that the pain levels of students within the past week due to muscle tightness were significant ($p < .001$). On average, participants reported experiencing pain of 3.8 (on a scale from 0 to 10 where "0" is pain free and "10" is worst possible pain) due to muscle tightness. In addition, pain limited individuals' daily activities and contributed to their decision not to participate in recreational actives (see Table 4).

Impact of pain on one's life was further examined through three additional questions. Most participants

Table 2. Descriptive Statistics for MTM Screening

Questions	Frequency (Dichotomous)[a]		Mean	*SD*
	Yes	No		
Experiencing muscle tightness	72	28	1.28	0.4513
Pain due to muscle tightness[a]	56	44	1.44	0.4989
Experiencing physical limitations[a]	21	79	1.79	0.4094
Have full range of motion in the body[a]	76	24	1.24	0.4292
Experiencing restrictions in the body[a]	30	70	1.91	0.7120
Inability to relax restricted body area[a]	33	67	1.67	0.4726
Sleep in certain position due to restriction	26	74	1.74	0.4408
Experiencing chest muscle tightness	39	61	1.61	0.4902
Experiencing difference in muscle texture[a]	56	33	1.55	0.6872
Experiencing unusual sensations (numbness, tingling)[a]	27	73	1.79	0.5529
Experiencing lack of strength	33	67	1.67	0.4726
Experiencing lack of coordination	13	87	1.87	0.3380
Experienced fall within the last year	5	95[c]	2.11	0.4471

Note. $N = 100$ participants. MTM = muscle tightness measurement.
[a]On a scale from 1 to 3, where yes = 1; no = 2, and not available = 3.
[b]Seven characteristics of muscle tightness based on the MTM tool.
[c]Includes both "no" responses and responses that were not available.

Table 3. Cross Tabulation of Muscle Tightness With the Attributes of the MTM Tool

Characteristic	Mean	*SD*	χ^2	*p*
Pain due to muscle tightness[a]	1.44	0.499	43.38	.001*
Experiencing physical limitations[a]	1.79	0.409	4.50	.034*
Have full range of motion in the body[a]	1.24	0.429	2.01	.156
Experiencing restrictions in the body[a]	1.91	0.712	44.78	.001*
Inability to relax restricted body area[a]	1.67	0.473	8.73	.003*
Sleep in certain position due to restriction	1.74	0.441	10.16	.001*
Experiencing chest muscle tightness	1.61	0.490	3.20	.073
Experiencing difference in muscle texture[a]	1.55	0.687	0.56	.451
Experiencing unusual sensations (numbness, tingling)[a]	1.79	0.553	4.06	.131
Experiencing lack of strength	1.67	0.473	1.12	.289
Experiencing lack of coordination	1.87	0.338	0.18	.672
Experienced fall within the last year	2.11	0.447	7.08	.029*

Note. MTM = muscle tightness measurement.
[a]Denotes seven characteristics of muscle tightness.
*Significant results based on $p < .05$.

(82%) reported pain level of 1–3 in the preceding week; however, 10 participants reported pain levels of 6–8. Most participants (88%) reported mild limitations on activities of daily living, and 75% reported mild limitation in recreational activities due to pain.

Strategies to Manage Muscle Tightness and Pain

Participants provided insights into how they manage their symptoms of muscle tightness and pain through open-ended questions. The participants identified strategies that improved muscle tightness and pain to include exercise, stretching along with self-myofascial release utilizing foam rollers, and the use of heat and ice. They also identified factors that made muscle tightness and pain worse: muscle tightness and pain worsened with high levels of physical activity, overexhaustion of the body, low body temperatures, weather, and body posture/positions during sleeping and stretching. Similar strategies were used when muscle tightness was not accompanied by pain (see Table 5).

Discussion

Our study found a high prevalence of muscle tightness in young adults. Women were more likely than men in our study to experience muscle tightness, a finding that is consistent with those of Lin et al. (2018) and Thakur and Rose (2016). Perhaps, the most surprising and concerning finding was that most participants with muscle tightness reported that their condition was chronic—that is, it had lasted over a year. Chronic muscle tightness requires more rigorous evaluation and treatments, but study participants did not report having been formally evaluated by a healthcare provider or having received any physical therapy; rather, most participants managed their symptoms themselves using ice, heat, gentle exercise, and stretching. Thus, it is unlikely that muscle tightness is a self-limiting condition that will resolve on its own. Bhimani and Anderson (2017) have reported that chronic muscle tightness affects quality of life and that affected individuals learn to adapt by limiting their life activities. A small percentage of our participants with muscle tightness reported falling in the last year, which suggests that falling also might be a long-term sequela of muscle tightness, which requires further research.

More than half of participants reported experiencing pain with this condition. Pain was reported to be mild to moderate (range, 1–7) on a numeric rating scale of 0–10, which is a considerable burden at this age. Leisure and daily activities of life were also limited by pain; this finding is also supported by Bhimani and Anderson (2017), nonetheless, patients found ways to accomplish their daily activities of living. To our knowledge, this study is the first to evaluate the prevalence and characteristics of muscle tightness in young adults. Our findings suggest that the assumption that minor conditions such as

Table 4. Cross Tabulation as a Relationship of Muscle Tightness With Pain

		t Test		
Questions	Mean[a]	*SD*	*t*	Significance
Average pain—past week	3.80	1.71	16.65	.001
Pain limiting activities of daily living	1.86	1.51	9.22	.001
Pain limiting recreational activities	2.36	2.32	7.59	.001

[a]Mean is on a scale from 0 to 10 where "0" is pain free and "10" is worst possible pain.

Table 5. Common Strategies Used in Managing Muscle Tightness and Pain

Students With Muscle Tightness and Pain	Students With No Muscle Tightness But Only Pain	Overlapping Strategies
Self-care strategies for improvements		
Exercise	Light exercise	Gentle exercise
Resting	Hot yoga	Self-myofascial release
Chiropractor/physical therapy	Trigger point therapy	Heat/ice application
Better posture	Electromagnetic stimulation	Stretching
Things that worsen the condition		
Stress	Improper corresponding gear (i.e., shoes)	High level of physical activity
Lack of movement	Bad nutrition	Overexhaustion due to exercise (heavy lifting)
Low hydration levels	Long periods of rest	Cold body/weather
Not stretching	Time for self-physical healing	Specific body/posture positions (i.e., sleep and stretching)

muscle tightness will resolve on their own in this population may not be true. Indeed, we found that muscle tightness is not short term and that its lingering effects may negatively influence quality of life. Thus, it is imperative that nurses, coaches, and healthcare professionals take complaints of muscle tightness seriously and ensure that prompt evaluation and treatment are afforded to prevent this condition from becoming chronic.

We found four characteristics of muscle tightness to be significant: pain, limitation of physical activities, asymmetry (restrictions in the body), and inability to relax muscle. The lexicon of range of motion is not common in daily conversation, so it is possible that participants did not identify with that characteristic of muscle tightness. Nonsignificant findings of change in muscle texture and unusual sensation warrant further investigation. Because not all characteristics of muscle tightness occur at the same time (Bhimani et al., 2020), it is possible that the constellation of characteristics is slightly different in young adults than in mature adults.

Our study has some limitations. We used a convenience sample from a single college, but it does provide insights into the prevalence of this condition in young adults. This is an observational study; therefore, we recommend use of a stronger method, such as cohort design, in future studies. This was a quantitative study where data provide a glimpse of this condition in young adults. Further studies should focus on understanding experiences of muscle tightness through a qualitative lens to examine young adults' perspective and to identify what contextual factors lead to muscle tightness becoming chronic in nature.

Implications for Orthopaedic Nursing Practice

Orthopaedic nurses are experts in musculoskeletal conditions. Symptoms of muscle tightness are likely to occur after injury, accidents, trauma, or surgery. When evaluating individuals with bone conditions, concurrent evaluation of muscle health is warranted. Some conditions such as sprain and strain are muscular in nature; however, such short-term muscle tightness can become chronic. Pain, changes in sensations or gait, and inability to perform activities of daily living and recreational activities are clues that must be investigated further to ensure that a patient is not experiencing muscle tightness. Chronic muscle tightness is an invisible condition in patients who have learned how to manage their life and live with restrictions. They often do not seek care for tightness; rather, their inability to perform certain tasks or pain prompts them to seek care. Muscle tightness has subjective elements of pain and changes in sensation; therefore, this condition cannot be fully evaluated by objective measures. It is crucial that patient reports are used to understand the symptoms as they experience them. Having awareness in practice about muscle tightness is the first step in providing timely and effective care. If chronic muscle tightness is encountered at bedside or in clinical practice, it is advisable to refer patients for further evaluation by advance practice nurses or physicians. Adding muscle tightness to the orthopaedic nurse's clinical practice checklist provides patients with evidence-based care in a timely manner.

Conclusions

Muscle tightness had a high prevalence in the young adults who participated in our study. The condition was more common in women than in men and was often accompanied by pain. Results indicate that most young adults manage this condition on their own, leading to this condition becoming chronic in nature. It is imperative that nurses and healthcare professionals evaluate and treat this condition in a timely manner to prevent it from becoming a long-term, life-limiting condition.

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