

MUSCULOSKELETAL

IN REVIEW

TM

Volume 3, Number 4

Published by Physicians Specializing In
Musculoskeletal Medicine

July 5, 2016

AEROBIC EXERCISE FOR INSTITUTIONALIZED PATIENTS WITH DEMENTIA

Previous research has demonstrated a correlation between aerobic exercise and cognitive health. However, research on the effects of long-term physical exercise programs on the cognitive status of patients institutionalized with dementia are scarce. This study presents longitudinal data involving institutionalized patients with dementia to help clarify the effects of an exercise program on cognitive decline and impairment.

Subjects were residents of an elderly home care facility, who were able to engage in aerobic exercise. Medical information was obtained from medical records. Cognitive impairment was determined before and after intervention by the Mini Mental State Examination. Other tests were used to evaluate functional mobility, psychiatric disturbances, activities of daily living, depression, and memory. The patients were randomized to an exercise group (EG) or to a control group (CG). The EG engaged in cycling using a recumbent bicycle for 15 minutes each day, for a total of 15 months. A physiotherapist monitored each session.

Those in the EG exercised a mean of 108.45 minutes per week. With the exception of depression, all variables improved in the EG and worsened in the CG. A decline in cognitive function was observed in those in the CG ($p=0.015$), while a slight improvement was observed in those included in the EG. Significant improvement was observed in the neuropsychiatric symptoms ($p = 0.020$), memory function ($p = 0.028$) and functional mobility ($p = 0.043$) among those in the EG.

Conclusion: This prospective study of patients institutionalized with

dementia found that aerobic exercise, 15 minutes per day, could result in improvement in cognition, functional mobility, neuropsychiatric symptoms and memory.

Cancela, J et al. Effects of a Long-Term Aerobic Exercise Intervention on Institutionalized Patients with Dementia. *J Sci Med Sport*. 2016, April; 19(4):293–298.

AGE EFFECT ON YOUTH SPORTS INJURIES

The relative age effect (RAE) is a phenomenon suggesting that children born in, or right after, a critical age cutoff month may have an advantage both in school and sports because of the physical and emotional maturity relative to peers. This study explored the importance of RAE as a predictor of sports injuries.

The study population consisted of children, 5-17 years of age, presenting to a Children's Hospital between 2000 and 2009. From the 121,047 patient visits a probability sample was randomly drawn. For each patient, the relative age for each sport was identified, defined as a child's birth month relative to the month his/her activity used as an arbitrary age cutoff. Data were reviewed for the association between injuries and the relative age at the time of injury.

The final study group included 1997 children. Among the pre-pubescent children, the relatively younger displayed a higher rate of injury relative to their older peers. In the pubescent group, more injured patients were born in the month of or after the cutoff.

Conclusion: This study of athletic injuries among children found that among pre-pubescent athletes, the relatively younger children displayed a higher risk of injury compared to their relatively

older peers. The analysis of the pubescent age group found that the reverse may be true.

Straciolini, A., et al. The Relative Age Effect on Youth Sports Injuries. *Med Sci Sport Exer*. 2016, June; 48(6):1068-1074.

ANKYLOSING SPONDYLITIS TREATED WITH ETANERCEPT AND SULFASALAZINE

Ankylosing spondylitis (AS) is a painful inflammatory rheumatic disease affecting the axial skeleton. Despite its global prevalence, controlled trials evaluating the efficacy and safety of biologic agents to treat this condition have occurred mostly in North America and Western Europe. This study was designed to assess the efficacy of etanercept compared with sulfasalazine for the treatment of patients with AS from Asia, Eastern/Central Europe and Latin America.

The ASCEND study was a randomized double-blind multicenter study comparing the safety and efficacy of etanercept with sulfasalazine in adult patients with active AS who had failed nonsteroidal anti-inflammatory drug treatment. The primary endpoint was the proportion of subjects who achieved a 20% improvement from baseline according to ASAS (ASAS20) criteria. Adverse events were recorded and physical examinations as well as laboratory tests were conducted to assess safety. A total of 297 patients met the study criteria of whom 190 received etanercept and 97 received sulfasalazine. Significantly more patients in the etanercept group achieved ASAS20 as compared to those receiving sulfasalazine at every time point measured ($p \leq 0.008$). In addition, a significantly greater proportion of patients in the etanercept group achieved ASAS40

Editor-in-Chief

Daniel Burke, B.S.
*Georgia College & State University,
Milledgeville, GA*

Content Editor

David T. Burke, M.D., M.A.
Emory University, Atlanta, GA

Executive Editor

Di Cui, M.D.
Emory University, Atlanta, GA

Copy Editor

Tracie E. McCargo, EMBA
*Harvard University Extension School,
Cambridge, MA*

Distribution Manager

Michael P. Burke, M.S.

compared with the sulfasalazine group ($p \leq 0.001$). At week 16, the proportion of patients achieving partial remission, a 50% response in the Bath Ankylosing Spondylitis Disease Activity Index, and all health-related quality of life parameters, were significantly greater in the etanercept group as compared to those in the sulfasalazine group ($p = 0.002$).

Conclusion: This study of patients from Eastern/Central Europe, Latin America and Asia with ankylosing spondylitis found that treatment with etanercept is significantly more effective than sulfasalazine.

Damjanov, N et al. Assessment of Clinical Efficacy and Safety in a Randomized Double-Blind Study of Etanercept and Sulfasalazine in Patients With Ankylosing Spondylitis From Eastern/Central Europe, Latin America, And Asia. *Rheumatol Int*. 2016, May; 36 (5):643 – 651.

BALANCE TRAINING WITH MUSCLE STRENGTHENING IN OLDER ADULTS

Falls are the number one cause of injury, fractures and death among the older population. Although the cause of falls is often multifactorial, lower extremity weakness and decreased balance are two significant factors. This study evaluated the effect of a balance training program, including calf muscle strengthening, on balance and the fear of falling, and explored how well calf muscle strength

correlates with other fall risk factors.

Subjects were sixty years of age or older, recruited from a senior center in Philadelphia. All were independent with community mobility, with or without an assistive device. At baseline, all participants were assessed with measures of static and dynamic balance, calf muscle strength, functional lower extremity strength and endurance, functional mobility, and fear of falling. Each subject underwent a five-week, 10-session program of 30 minutes per session, using exercises that challenged static balance, dynamic balance, and strengthening exercises. Complexity and speed of balance exercises were steadily increased over the course of 10 sessions. Strengthening included three sets of heel raises, with 15 reps per set.

Subjects were 28 adults with an average age of 70 years. At follow-up, static balance with eyes closed, heel rise and results on the Timed Up and Go Test (TUG) and the 30-Second Chair Stand Test improved significantly. Heel rise ability was significantly related to the results of the TUG and the 30-Second Chair Stand Test. None of the participants who were able to perform 10 reps or more of heel rises were at a high risk of falls based on their TUG results.

Conclusion: This study of elderly individuals found that balance training including calf muscle strengthening performed for 30 minutes, twice a week for five weeks, resulted in significant improvement in calf muscle strength, functional performance and balance, as well as improvement in balance confidence.

Maritz, C., et al. A Prospective, Cohort Study on the Effect of a Balance Training Program, Including Calf Muscle Strength, In Community-Dwelling Older Adults. *J Geriatr Phys Ther*. 2016, July/September; 39 (3): 125-131.

BLOOD FLOW RESTRICTED EXERCISE

In order to enhance muscle mass and strength, resistance exercises, with loads of 70-80% of a one repetition maximum (one rep max) are typically recommended. Such resistance exercises are often challenging and may be contradicted in certain patients, including the elderly and recovering athletes. Several studies in recent years have

suggested that lower weights may be effective when combined with restricted blood flow, also known as Kaatsu training. This literature review and meta-analysis reviewed studies combining blood flow restriction exercise, in an effort to clarify the effectiveness of this technique and to understand which training method results in the greatest muscle strength and hypertrophy.

Medical databases were searched for articles investigating the effects of exercise combined with restricted blood flow to skeletal muscle on muscle hypertrophy and muscle strength. Among those reviewed, 47 were included in the meta-analysis. A total of 400 subjects from 19 studies focused on muscle strengthening.

Those studies that reviewed the effects of aerobic exercise combined with blood flow restriction reported a mean strength improvement of 0.4 N m greater than the control ($p = 0.04$). Those studies focusing on resistance exercise for strengthening found a mean improvement of 0.3 kg greater than the controls ($p < 0.01$). Of the 19 studies focusing on muscle hypertrophy, those in the blood flow restriction group had an increase in hypertrophy 0.4 cm greater than that of the control group ($p < 0.001$). Training programs at $>20\%$ one rep max performed better than those at less than 20%, while cuff systolic blood pressure at >150 mmHg resulted in greater strength gains than pressures below 150 mm Hg.

Conclusion: This study found that the addition of blood flow restriction to dynamic exercise training can be effective for increasing the effects on strength and hypertrophy.

Slysz, J., et al. Efficacy of Blood Flow Restricted Exercise: Systematic Review and Meta-Analysis. *J Sci Med Sport*. 2016, August; 19(8): 669-675.

CLIMBING FOR LOW BACK PAIN

Among the working age population, low back pain (LBP) is the most common cause of physical disability. Substantial evidence exists supporting the use of exercise as a therapeutic tool to improve symptoms of LBP. As climbing offers closed chain muscle training, this study reviewed the effects of this exercise technique among patients with LBP.

This prospective, randomized, controlled trial included 30 individuals

with chronic LBP, between 18 and 45 years of age, with a body mass index of 25 kg/m² or lower. None had climbing experience. All patients underwent baseline x-ray and MRI evaluation. Ten sessions of one-hour climbing activity occurred at least once a week over eight weeks. The control group subjects were instructed to not change their lifestyle, and were allowed to take paracetamol 500 mg, four times a day as needed. All patients were assessed at baseline, after eight weeks of treatment (T8) and six weeks after treatment ended (T14).

The climbing group had better improvement in VAS scores over time, in a resting position ($p < 0.0001$) and in the finger to floor condition ($p = 0.011$), with no significant difference between groups for VAS in motion. A significant improvement in the Oswestry Disability index was found over time, favoring the climbing group ($p = 0.022$). No significant difference was found in the analysis for gender, age, height, weight or duration of pain. Climbing was found to be safe without severe side effects.

Conclusion: This study of patients with chronic low back pain found that rock climbing may be a useful intervention for improving pain and disability.

Schinar, M., et al. Climbing Has a Positive Impact on Low Back Pain: A Prospective, Randomized, Controlled Trial. *Clin J Sports Med.* 2016, May; 26 (3): 199-205.

DECISION RULES AFTER ACL RECONSTRUCTION

It is estimated that 250,000 anterior cruciate ligament (ACL) injuries occur annually in the United States. While the intention to return to sport is a common reason for undergoing surgery, there is no clear evidence to guide whether return to sport should be delayed, and what level function should be achieved before this return.

Subjects were between 13 and 60 years of age who had participated in a level I or level II sport at least twice weekly before ACL injury. All participants underwent a preoperative rehabilitation program, with all undergoing bone-patella tendon-bone or hamstring autograft. The participants were advised against full participation in level I sports if, during rehabilitation, they had not regained at least 90% quadriceps and hamstring

strength and hopping performance in the injured leg, compared with the uninjured leg. Knee function, sports participation and any reinjury were recorded monthly.

The first two years after reconstruction, 30% of those returning to level I sports sustained a reinjury, compared with eight percent who participated in lower-level sports. The reinjury rate was reduced by 51% for each month that the return to sport was delayed until nine months after surgery. After this time, no further reduction was noted. Of those who failed the return to sport criteria, 38% suffered injuries, as compared to 5.6% among those who achieved the criteria. Symmetry of quadriceps was found to be correlated with a reduced risk of reinjury.

Conclusion: This prospective study of patients undergoing ACL reconstruction found that return to sport, delayed until at least nine months, and symmetric quadriceps strength prior to return were correlated with a significantly reduced risk of reinjury.

Grindem, H., et al. Simple Decision Rules Can Reduce Reinjury Risk by 84% after ACL Reconstruction: The Delaware-Oslo ACL Cohort Study. *Br J Sports Med.* 2016, July; 50(13): 804-808.

EXERCISE BEFORE PREGNANCY AND PELVIC GIRDLE PAIN

Approximately two to three percent of all women report chronic pelvic girdle pain one year after delivery. This study examined the association between pre-pregnancy leisure time exercise and pelvic girdle pain among pregnant women.

This prospective, population based cohort study, The Norwegian Mother and Child Cohort Study, was conducted by the Norwegian Institute of Public Health, recruiting participants between 1999 and 2008. Questionnaires queried the frequency and types of exercise performed before pregnancy, as well as information about maternal health, demographics, lifestyle behaviors and medical history. Participants reported how often they performed one of 14 exercises, rating the frequency of each. From these, seven groups were determined including; non-exerciser, brisk walking, non-weight bearing exercise, low impact exercise, high impact exercise, and horseback riding.

The primary outcome measure was pelvic girdle pain in pregnancy week 30.

Of the 39,184 singleton pregnancies included in the study, 10.4% reported pelvic girdle pain in pregnancy. Compared to women who developed pelvic girdle pain, those who did not more often reported an exercise frequency of 3-5 times per week ($p < 0.001$). In addition, participation in high impact exercises and high-impact aerobics were more commonly reported among those without pelvic girdle pain ($p < 0.001$). In adjusted models, those who exercised 3-5 times weekly before pregnancy had a 14% reduced risk of pelvic girdle pain during pregnancy as compared to those who did not exercise. Participation in high-impact exercise was also associated with a similar risk reduction.

Conclusion: This study showed that women who exercise regularly before their first pregnancy, particularly those participating in high-impact exercise, had a reduced risk of pelvic girdle pain during pregnancy.

Owe, K et al. Exercise Level Before Pregnancy and Engaging in High-Impact Sports Reduce the Risk of Pelvic Girdle Pain: The Population-Based Cohort Study of 39,184 Women. *Br J Sports Med.* 2016, July; 50 (13):817-822.

GABAPENTIN FOR CHRONIC LOW BACK PAIN

Chronic low back pain (LBP) is a prevalent and often disabling condition for which there are few effective interventions. As treatment with gabapentin has shown some evidence of efficacy in patients with fibromyalgia, this study evaluated the efficacy of gabapentin for patients with chronic LBP, with or without leg pain.

This prospective, randomized, double-blind, placebo controlled trial included patients 21 to 70 years of age with nonspecific LBP, present daily for six months or longer. The participants agreed to discontinue muscle relaxants, antidepressants and opioids at least two weeks before the trial. The patients were randomized to receive either gabapentin, titrated to 1,200 mg, three times per day by week four, or a placebo. The primary outcome measure was pain intensity, as determined by the Descriptor Differential Scale (DDS). The main

secondary outcome measure of everyday functioning was the Oswestry Disability Index (ODI).

Of the 108 individuals who were randomized, 55 were assigned to the gabapentin group and 53 to the placebo group. Of these, 72 (71.3%) completed all 12 weeks of the study. Pain intensity decreased significantly over time for all participants, with subjects reporting pain reduction of 30% from baseline. There were no differences between groups in DDS assessed pain intensity ($p=0.423$) or change in pain unpleasantness ($p=0.523$). Similar, nonsignificant differences were noted for measures of disability.

Conclusion: This study of patients with chronic low back pain did not find that gabapentin is more effective than placebo for reducing pain and increasing function.

Atkinson, J., et al. Randomized, Controlled Trial of Gabapentin for Chronic Low Back Pain with and without a Radiating Component. *Pain*. 2016, July; 157(7): 1499-1507.

HIGH FAT MEDITERRANEAN DIET AND BODY WEIGHT

The PREvencion con Dieta MEDiterranea (PREDIMED) trial provided first-level evidence of cardiovascular protection by the Mediterranean diet. This study analyzed data from this trial in order to assess the long-term changes in body weight and waist circumference associated with the Mediterranean diet.

This five-year, parallel group, randomized, clinical trial included participants at high cardiovascular risk, comparing unrestricted calorie Mediterranean diets enriched with extra virgin olive oil, or with mixed nuts, with a control diet (advice to avoid all dietary fat). The subjects were community dwelling men, ages 55 to 80 years, and women, ages 60 to 80 years, with multiple cardiovascular risk factors. The study analyzed the effects of these interventions on body weight and waist circumference recorded over five years.

Subjects were 7,447 men and women with an average age of 67 years, followed for a median of 4.8 years. Over 90% were overweight or

obese at the beginning of the study. Participants in the extra-virgin olive oil group had a significant decrease in body weight. The average, between- group changes were significant at three years ($p=0.026$) and five years ($p=0.044$). Those in the nut group had significant decreases in body weight, although this did not differ from that of the control group. A multivariable adjusted analysis showed significantly lower waist circumference at three and five years for those in the olive oil group and at five years for those in the nut group.

Conclusion: This study describing a long-term intervention with an unrestricted calorie, high vegetable fat Mediterranean diet demonstrates that this diet is associated with decreases in body weight and less gain in central adiposity as compared to a diet advising individuals to restrict their intake of dietary fat.

Estruch, R., et al. Effect of a High-Fat Mediterranean Diet on Body Weight and Waist Circumference: A Prespecified, Secondary Outcomes Analysis of the PREDIMED Randomized, Controlled Trial. *Lancet Diabetes Endocrin*. 2016 [http://dx.doi.org.proxy.library.emory.edu/10.1016/S2213-8587\(16\)30085-7](http://dx.doi.org.proxy.library.emory.edu/10.1016/S2213-8587(16)30085-7)

IDIOPATHIC FROZEN SHOULDER

Previous studies of frozen shoulders have demonstrated a radiographic enhancement and increased thickness of the joint capsule, as well as hypermetabolic lesions in the rotator interval, anterior joint capsule and axillary recess. This study compared the short-term effects of corticosteroid injections into different sites including the glenohumeral joint space, the subacromial space or both.

Subjects included 133 adult patients with idiopathic frozen shoulder. The subjects were randomized to receive ultrasound-guided injections using a solution of 40 mg of triamcinolone and 4 mL of 1% lidocaine, delivered at the glenohumeral joint (IA group), the subacromial space (SA group), or both sites (IA + SA group). The

primary outcome measures included the ASES shoulder score, a visual analog scale (VAS) for shoulder pain with motion, subjective shoulder value (SSV) and passive range of motion. Assessments were performed before treatment and at three, six and 12 weeks after the injection.

All outcome measures in all groups were significantly improved at three, six and 12 weeks after the injection as compared with baseline ($p<0.001$). The improvement of the IA and IA + SA groups were significantly greater than that of the SA group for ASES scores, VAS pain scores, SSV scores, and internal rotation.

Conclusion: This study of patients with idiopathic frozen shoulder found that intra-articular injections alone or combined with subacromial injections resulted in better outcomes than did subacromial injections alone.

Cho, C et al. Proper Site of Corticosteroid Injection for the Treatment of Idiopathic Frozen Shoulder: Results from a Randomized Trial. *Joint Bone Spine*. 2016, May; 83(3):324-329.

LUMBAR FACET SYNDROME TREATED WITH ORAL DICLOFENAC OR STEROID INJECTION

Lumbar facet joint syndrome is thought to be an important cause of low back pain (LBP). The efficacy of facet injections with steroids or oral nonsteroidal anti-inflammatory drugs (NSAIDs), while commonly performed, have yet to be fully vetted. This study compared the effectiveness of oral NSAIDs with steroid facet injections by measures of function and pain.

Consecutive patients presenting with LBP, with or without thigh pain, were evaluated for inclusion. Those diagnosed with lumbar facet syndrome were invited to participate. Subjects were randomized to one of three treatment groups: an oral diclofenac group, to receive two weeks of 50 mg tablets taken twice daily, a methylprednisolone facet injection group, to receive 80 mg injections of methylprednisolone acetate, combined with one ML 0.5% bupivacaine, or a combination group

to receive both. The primary endpoints were scores on the Oswestry Disability Index (ODI) and a visual analogue scale (VAS) of pain, both administered before treatment and at four and 12 weeks post-treatment.

Comparing treatment groups at each time point, the combined group realized significantly better ODI scores than the oral group at four- and 12-week follow-ups ($p < 0.001$ for both comparisons). The injection group had better ODI scores than did the oral group at four- and 12-week follow-ups ($p < 0.001$ and $p = 0.004$, respectively). The combined group demonstrated significantly better ODI scores than did the injection group at four-week follow-up ($p = 0.02$). Comparing VAS scores, the combined group and the injection group both realized significant reductions in VAS scores as compared to the oral diclofenac group at the four-week follow-up ($p < 0.001$ for both comparisons).

Conclusion: This study of patients with lumbar facet syndrome found that the combination of oral diclofenac and injected methylprednisolone is more effective than either alone, with the benefit strongest within four weeks of treatment.

Sae-Jung, S., et al. Outcomes of Lumbar Facet Syndrome Treated with Oral Diclofenac or Methylprednisolone Facet Injection: A Randomized Trial. *Int Orthop*. 2016, June; 40(6): 1091-1098.

KETOROLAC AFTER SURGERY AND FRACTURE HEALING

A number of studies have suggested that nonsteroidal anti-inflammatory drugs (NSAIDs) may have detrimental effects on fracture healing. This study evaluated the effect of ketorolac, used during the first 24 hours after surgery, on the healing of fractures.

This retrospective, comparative study included patients with femoral or tibial shaft fractures, who were treated surgically. The patients were divided into two groups: those who received ketorolac within 24 hours after surgery and those who did not. The ketorolac was administered at 15 to 30 mg every six hours. The primary endpoints included repeat

surgery for repair of a nonunion and time to union.

The subjects were 80 patients with 85 fractures in the ketorolac group (Group 1) and 233 patients with 243 fractures in the control group (Group 2). The average time to union of the femur was 147 days for Group 1 and 159 days for Group 2 ($p = 0.81$). Healing time for the tibia was 175 days for each group. All patients with a nonunion in the study group were current smokers.

Conclusion: This study found that ketorolac used within 24 hours of lower extremity fracture surgery had no ill effect on fracture healing.

Donahue, D., et al. Ketorolac Administration in the Recovery Room for Acute Pain Management Does Not Affect Healing Rates of Femoral and Tibial Fractures. *J Orthopaedic Trauma*. DOI:10.1097/BOT.0000000000000620

MEASUREMENT ERROR WITH IMPACT TESTING

After a mild traumatic brain injury (TBI), computerized neurocognitive tests remain a cornerstone of concussive assessment. The Immediate Post Concussion Assessment and Cognitive Testing (ImPACT) is the most widely used of the neurocognitive testing programs in concussion management. This literature review was designed to better assess the reliability of the ImPACT test.

A literature review was completed using studies published between January of 1999 and November of 2014. The search was completed for studies assessing the ImPACT compared with other methods of neuropsychological testing in patients with brain injury. Studies selected were included if participants completed the ImPACT at least twice. Of the 5,943 articles reviewed, ten were chosen for full review and meta-analysis. Seven of the nine studies reported a Pearson r as a measure of test-retest reliability. Within each study, the visual/motor processing speed was consistently the most reliable composite score, with verbal memory and visual memory demonstrating the least reliability. With the exception of processing speed, all composite scores

exhibited poor to moderate reliability.

Conclusion: This literature review and meta-analysis of ImPACT testing found that the majority of ImPACT composite scores failed to reach good reliability.

Alsalaheen, B., et al. Measurement Error in the Immediate Postconcussion Assessment and Cognitive Testing (ImPACT): Systematic Review. *J Head Trauma Rehab*. 2016, July/August; 31(4): 242-251.

MEMORY RETENTION ENHANCED BY PHYSICAL EXERCISE

Previous studies suggest that persistent long-term memory depends upon successful stabilization and integration of new memories after the initial coding. This consolidation has been found to require neuromodulation factors, including dopamine, noradrenaline and brain derived neurotrophic factor. As exercises have been found to stimulate the release of several of these factors, this study investigated whether exercise might influence the consolidation of new memories and retrieval.

Participants were randomly assigned to one of three groups after first encoding a set of 90 picture-location associations over a period of approximately 40 minutes. The groups performed exercises immediately or four hours after the encoding session, while a third refrained from exercise. At 48 hours, participants returned for a cued recall test, undergoing magnetic resonance imaging.

Retention in the delayed exercise group was found to be higher than that in the immediate exercise and the no exercise groups, with no difference noted between the latter two. Memory retention was not correlated with the participants' reported routine weekly exercise schedule. The MRI findings suggested an increased hippocampal pattern similarity for correct responses during delayed retrieval.

Conclusion: This study found that properly timed physical exercise can improve memory retention.

VanDongen, E., et al. Physical Exercise Performed Four Hours after Learning Improves Memory Retention and Increases Hippocampal Pattern Similarity during Retrieval. *Current Biology*. 2016,doi:10.1016/j.cub.2016.04.071.

MUSCULOSKELETAL INJURIES AND CARPAL TUNNEL SYNDROME

Risk factors for carpal tunnel syndrome (CTS) include female gender, pregnancy, obesity and manual labor. As musculoskeletal injuries may force affected individuals to adopt adverse postures, this study assessed the association between those injuries and CTS in a group of Latino manual laborers.

Subjects were Latino poultry and non-poultry manual labor workers in four rural counties in western North Carolina. The participants underwent a one-hour interview, answering questions regarding their work and health. Data were recorded of self-reported changes in health and pain in shoulders, elbows or low back that had occurred on at least two days during the preceding month. Sports medicine physicians conducted musculoskeletal examinations, with a particular focus on the site of the pain. Participants also underwent nerve conduction studies (NCSs) on bilateral wrists, with findings scored as no CTS, possible CTS, and CTS. The findings were dichotomized into CTS (combined CTS and possible CTS) and no CTS. Musculoskeletal injuries were compared with NCS findings.

A total of 512 participants, with a mean age of 34.7 years and a mean body mass index of 28.7 kg/m², completed the study. Of these, 14.6% had rotator cuff syndrome, 5.7% epicondylitis and 48.6% CTS in at least one extremity. The association between rotator cuff syndrome and CTS was significant for all individuals ($p=0.03$), with a greater odds ratio in the right arm. The association between epicondylitis and CTS failed to reach statistical significance.

Conclusion: This study found that individuals with rotator cuff syndrome have a higher prevalence of carpal tunnel syndrome.

Cartwright, M., et al. Examining the Association between Musculoskeletal Injuries and Carpal Tunnel Syndrome in Manual Laborers. *Muscle Nerve*. 2016, July; 54 (1): 31-35.

OVERWEIGHT HIP FRACTURE PATIENT SURVIVAL

Previous studies have suggested that up to half of patients suffering from a hip fracture are malnourished upon hospital admission. Some have found an association between increased in-hospital mortality rate and low body mass index (BMI). This study evaluated the association between BMI and one-year survival in relatively healthy, elderly hip fracture patients.

Consecutive patients with a hip fracture admitted to one of four university hospitals in Stockholm were assessed for inclusion. Eligible patients were >65 years of age, living independently, with no diagnosis of dementia or severe cognitive impairment. Each patient's physical status was assessed before surgery, with cognitive function evaluated using the SPMSQ. Living conditions both before the hip fracture and one year postoperatively were recorded. A BMI was calculated for each patient and compared with one-year outcome. A BMI of less than 22 kg/m² was used as the cutoff for overweight and risk of malnutrition.

Of the 843 patients included in the study, the one-year mortality rate was 16% in patients with a BMI of less than 22 kg/m², 18% among those with a BMI of 22-26 kg/m² and 6% among those a BMI of >26 kg/m². The unadjusted odds ratio for one-year survival in patients with a BMI of >26 kg/m² was 2.7, compared to the group with a BMI of <22 kg/m², and 3.1 compared to the group with a BMI of 22-26 kg/m².

Conclusion: This prospective study of patients with acute hip fracture found that survival was superior among patients with a body mass index above 26 kg/m², as compared with those with a lesser body mass index.

Flodin, L., et al. Increased One-Year Survival and Discharge to Independent Living in Overweight Hip Fracture Patients. *Acta Orthop*.

2016, April; 87(2): 146-151.

PREDICTORS OF FAILURE OF CONSERVATIVE TREATMENT OF FULL-THICKNESS ROTATOR CUFF TEARS

Rotator cuff tears are prevalent, affecting an estimated 10% of persons over the age of 60 years in the United States. Nonoperative treatment is effective for many patients, with surgical repair failure rates estimated at 25 to 90%. This study was designed to identify predictors of surgery among patients with these injuries.

This prospective, multicenter, cohort study included patients with full-thickness rotator cuff tears. The participants engaged in a physical therapy program developed from a systematic review of the literature, and returned for evaluations at six and 12 weeks. Those who were cured or improved were scheduled for reassessment in six weeks. Those who were not better two years to determine whether they had undergone surgery since their last visit.

Of the 433 patients seen, 20% elected to undergo surgery. Using a multivariate adjusted model, patients' expectations regarding the effectiveness of rehabilitation ($p<0.0001$) was found to be the most significant predictor of failure of rehabilitation and ultimate surgical intervention. Those with higher activity levels and nonsmoking patients were also more likely to undergo surgery. Structural factors, including size of tear, pain scale scores, and weakness were not predictors of choosing surgery.

Conclusion: This study of patients with full-thickness rotator cuff tears found that the patient's decision to undergo surgery was influenced more by low patient expectations regarding the effectiveness of physical/occupational therapy than by the patient's symptoms or anatomic features of the rotator cuff injury.

Dunn, W., et al. Predictors of Failure of Nonoperative Treatment of Chronic, Symptomatic, Full-Thickness Rotator Cuff Tears. *J Shoulder Elb Surg*. 2016, August; 25(8): 1303-1311.

RADIOGRAPHIC ABNORMALITIES IN THE ELBOWS OF YOUTH BASEBALL PLAYERS

It is estimated that 20% of baseball players between the ages of eight and 12 years of age will experience arm pain during a single youth baseball season. This study examined elbow abnormalities in asymptomatic little league baseball players to review the association between these findings and the players' throwing history and physical examination.

This prospective study included 26 Little League baseball players recruited from the highest league level within the district. All patients underwent a detailed history, physical examination of both upper extremities and an MRI of the elbow. Those who reported a history of pain or injury to the arm from baseball were compared to those with a negative history.

The subjects were a mean age of 11.4 years with a mean playing time of 6.2 years. Of these 27% responded "yes" to having sustained an arm injury from throwing, or to having had experienced arm pain from throwing. Asymmetric MRI abnormalities were observed in the dominant elbows of 35% of the cohort with one third of these having two abnormalities. Those with positive MRI findings demonstrated a greater reduction in shoulder internal rotation compared to the nondominant arm. Factors associated with positive MRI findings were year-round play and working with a private coach.

Conclusion: This study of asymptomatic youth baseball players found that MRI abnormalities involving the medial aspect of the elbow were common in year-round baseball players, especially among those with glenohumeral internal rotation deficits and among those using private coaches.

Pennock, A., et al. Preseason Assessment of Radiographic Abnormalities in the Elbows of Little League Baseball Players. *J Bone Joint Surg.* 2016, May; 98(9):761 – 767.

RETURN TO SPORT AFTER ROTATOR CUFF REPAIR

One of the main expectations of athletes undergoing rotator cuff

repair surgery is to return to sport after treatment. This systematic review and meta-analysis of the literature was designed to better understand the rate of return to sport after treatment of rotator cuff tears.

A literature search was performed using multiple databases for studies which focused on rotator cuff tear/repair/return to play/return to sport. The final search was performed in October of 2014. Data were extracted and analyzed to determine the mean rate of return to sport. Secondary outcome variables included functional results and patient satisfaction.

The analysis included data from 25 studies, among which 22 were retrospective and five were comparative. From these, data concerning 859 patients with a mean age of 42.6 years were extracted. The mean delay between the rotator cuff injury or the beginning of symptoms and surgery was 14.5 months. The combined return to sport was 84.7%, with the time to return ranging from 4.1 to 17 months. Of those returning to sport, 65.9% reported returning at the same level as pre-injury. The rate of return to the same level of play was 49.9% in the professional athletes, 81.4% in the competitive athletes and 92.4% in the recreational athletes. Patient satisfaction with the repair ranged from 68.4% to 100%.

Conclusion: This meta-analysis of patients undergoing rotator cuff repair found that 84.7% returned to sport, with 65.9% of those returning at the same level of play as pre-injury.

Klouche, S., et al. Return to Sport after Rotator Cuff Tear Repair: A Systematic Review and Meta-Analysis. *Am J Sport Med.* 2016, July; 44(7): 1877-1887.

RISK OF FRACTURES AMONG USERS OF ALENDRONATE

Clinical management of osteoporosis has progressed with the introduction of antiresorptive drugs that reduce the risk of fractures in adults. However, some have expressed concern that these drugs may lead to atypical femur fractures, which could offset the benefits of long-term use. This study reviewed the association between long-term use of alendronate and

the risk of subtrochanteric and femoral shaft fractures.

Data were derived from a nationwide population-based open registry cohort study containing two nested case-controlled studies. The sample included treatment naive incident users of alendronate from 1996 to 2007 in Denmark who were ages 50 to 94 years at onset of treatment. Those who sustained a hip fracture during the study period were matched to controls. In addition, those who experienced a subtrochanteric/shaft fracture were identified as cases in a second database, also matched to controls. Exposure to alendronate was determined by pharmacy dispensations and used to determine the association between long-term use of alendronate and the risk of subtrochanteric and femoral shaft fractures. Subjects were 61,990 alendronate users followed for a median of 6.9 years. During that time, 1,428 sustained a subtrochanteric or femoral shaft fracture while 6,784 sustained a hip fracture. Conditional logistic regression analysis demonstrated a reduced risk of subtrochanteric and femoral shaft fractures among those who were highly adherent to alendronate use, as compared to those who were poorly adherent ($p=0.05$), although this finding changed when adjusted for comorbid conditions ($p=0.11$). Higher adherence was associated with a decreased risk of hip fracture as was a cumulative use of five to 10 dose-years ($p<0.001$) and 10 or more dose-years.

Conclusion: This study of patients treated with alendronate for up to 10 years found a 30% lower risk of hip fracture and no increase in the risk of fractures of the subtrochanteric femur and femoral shaft with the use of this drug.

Abrahamsen, B., et al. Risk of Hip, Subtrochanteric and Femoral Shaft Fractures among Mid- and Long-Term Users of Alendronate: Nationwide Cohort Nested Case-Control Study. *BMJ.* 2016;353:i3365.

ULTRASOUND TREATMENT APPLIED WITH EXERCISE FOR ANKYLOSING SPONDYLITIS

Ankylosing spondylitis (AS) is a chronic inflammatory disease that

often leads to back pain. Treatment goals include pain reduction and postural correction. As ultrasound (US) is a physical modality commonly used to treat musculoskeletal disorders, this study assessed the efficacy of US combined with exercise in ameliorating pain.

This randomized, prospective, double-blind, placebo-controlled trial included 50 patients diagnosed with AS. The subjects were randomized to perform exercise and receive US (15 minutes per session) or placebo US in 10 sessions over two weeks. Both groups were given instructions for an exercise program comprising postural stretching and breathing exercises. Both groups were evaluated for pain and stiffness, and with patient global assessments (PGAs), doctor global assessments (DGAs), the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), the Bath Ankylosing Spondylitis Metrology Index (BASMI), the Ankylosing Spondylitis Quality-Of-Life Questionnaire (ASQol), and the Ankylosing Spondylitis Disease Activity Score

(the ASDAS-ESR, and ASDAS-CRP).

While improvements were noted in both groups, significantly superior results were seen in the US group at week two for parameters of BASMI, tragus to wall distance, PGA and DGA, and at six weeks for daily pain and the PGA, VGA, BAS PAI, ASDAS-CRP, ASDAS-ESR, and lumbar side flexion, the modified Shober test and the ASQol.

Conclusion: This study of patients with ankylosing spondylitis found that continuous ultrasound treatment with exercise therapy can reduce pain, stiffness and disease activity, as well as improve lumbar mobility and quality of life, better than exercise alone.

Karaamanlioglu, D., et al. Effectiveness of Ultrasound Treatment Applied with Exercise Therapy in Patients with Ankylosing Spondylitis: A Double-Blind, Randomized, Placebo-Controlled Trial. *Rheum Intern*. 2016, May; 36 (5): 653-661.

Musculoskeletal in Review (MSK) is produced by physicians specializing in musculoskeletal and neurological medicine, with the cooperation and assistance of Emory University School of Medicine. Summaries appearing in this publication are intended as an aid in reviewing the literature relevant to the practice of clinical musculoskeletal medicine. The summaries appearing in this publication are intended as an aid in reviewing the broad base of literature relevant to this field.

These summaries are not intended for use as the sole basis for clinical treatment, or as a substitute for the reading of the original research.

MSK is affiliated with the World Health Organization and multiple national medical societies worldwide.

Private subscriptions are available by email at mskinreview@aol.com or by phone at (417) 779-9101.



MUSCULOSKELETAL IN REVIEW

**Produced by the Department of
Rehabilitation Medicine, Emory
University School of Medicine**

Expanding the frontier of medicine in research, teaching, and patient care