

2. LBP

Reductionist approach to LBP challenged

J Orthop Sports Phys Ther. 2019 May 15:1-18. doi: 10.2519/jospt.2019.8791.

Model Simulations Challenge Reductionist Research Approaches for Studying Chronic Low Back Pain.

Cholewicki J^{1,2}, Pathak PK^{1,3}, Reeves NP^{1,2,4}, Popovich JM Jr^{1,2}.

STUDY DESIGN:

Analytical and numerical simulations.

BACKGROUND:

Traditionally, low back pain (LBP) is studied using a reductionist approach, in which the factors contributing to the clinical presentation of LBP are studied in isolation to identify the primary pathology or condition linked to LBP. We argue that reductionism may not be suitable for studying LBP considering the complex, multi-factorial nature of this condition.

OBJECTIVES:

To quantify the likelihood of successfully subclassifying patients with LBP and effectively targeting treatment based on a single, dominant factor contributing to LBP.

METHODS:

Both the analytical and numerical simulations (Monte Carlo) of 1 million patients with LBP were performed. A number of factors contributing to LBP were randomly assigned to each individual. The following outcome measures were computed based on a number of factors: (1) the percentage of individuals that could be subclassified by identifying a single factor exceeding a certain threshold and (2) the average reduction in LBP when a treatment eliminates the largest contributing factor versus a multimodal treatment that eliminates a number of the randomly selected factors.

RESULTS:

With an increasing number of factors, the probability of subclassifying an individual to a subgroup based on a single factor tends to zero. A multimodal treatment arbitrarily addressing any 2 or more factors was more effective than diagnosing and treating a single factor that maximally contributed to LBP.

CONCLUSION:

Results suggest that reductionism is not appropriate for subclassifying LBP or targeting treatment. The use of reductionist approaches may explain some of the challenges with creating LBP classification system and designing more effective treatment interventions. *J Orthop Sports Phys Ther, Epub 15 May 2019. doi:10.2519/jospt.2019.8791.*

Convergence and divergence in LBP care

J Orthop Sports Phys Ther. 2019 May 15:1-62. doi: 10.2519/jospt.2019.8451.

Convergence and Divergence Between Exercise Based Approaches for Management of Low Back Pain That Consider Motor Control.

Hides J^{1,2}, Donelson R³, Lee D⁴, Prather H⁵, Sahrman S⁶, Hodges PW⁷.

Many approaches for low back pain (LBP) management focus on modifying motor control, which refers to motor, sensory and central processes for control of posture and movement. A common assumption across approaches is that the manner an individual loads the spine by their typical postures, movements and muscle activation strategies, contributes to symptom onset, persistence, and recovery.

However, there are also divergent features. This commentary presents key principles of four clinical physical therapy approaches that include consideration of motor control in LBP management, considers their convergence and divergence, and discusses their interface with medical LBP management. The approaches considered are *Movement System Impairments*; *Mechanical Diagnosis and Therapy*; *Motor Control Training*, and *Integrated Systems Model*.

These were selected to represent some of the diversity of applications, including; approaches with motor control as a central versus adjunct feature, and approaches that are evidence-based versus evidence-informed. Identification of areas of convergence and divergence of approaches is designed to clarify key aspects of each approach as a guide for the clinician and to provide a platform for considering a hybrid approach tailored to the individual patient. *J Orthop Sports Phys Ther*, Epub 15 May 2019. doi:10.2519/jospt.2019.8451.

Factors for LBP – low exercise

Factors associated with chronic and acute back pain in Wales, a cross-sectional study

- Steinthora Jonsdottir, Haroon Ahmed, Kristinn Tómasson and Ben CarterEmail

BMC Musculoskeletal Disorders 2019 **20**:215

<https://doi.org/10.1186/s12891-019-2477-4>

Background

Back pain is one of the most common causes for disability in the working population. Some risk factors for back pain are well known, however little is known about factors uniquely associated with acute or chronic back pain.

This study aimed to elucidate patterns uniquely associated with acute or chronic back pain.

Methods

This study performed secondary analysis of data from the Welsh Health Survey 2012, a nationwide cross-sectional survey.

A multivariable analysis was carried out for risk factors found to be significantly associated with acute and chronic back pain.

Results

We found that increased BMI (aOR 1.20, 95% Cis 1.08, 1.33; BMI > 30), mental health score below average (aOR 1.59, 95% CIs 1.47, 1.72), having a degree (aOR 1.28, 95% CIs 1.12, 1.47) and being older than 24 years ($P < 0.001$) were associated with increased prevalence of acute back pain.

Higher prevalence of chronic back pain was seen in individuals characterised by increased deprivation (WIMD) (aOR 1.61, 95% CIs 1.32, 1.96); increased age (aOR 7.34, 95% CIs 5.25, 10.26; for 65+); being female (aOR = 1.43, 95% CIs 1.27, 1.61); lower educational attainment (aOR 0.44, 95% CIs 0.36, 0.55) higher BMI (aOR = 1.60 95% CIs 1.38, 1.85; BMI > 30); poorer mental health score (aOR = 3.11 95% CIs 2.76, 3.51), and a sedentary lifestyle (aOR = 0.58, 95% CIs 0.49, 0.69; 3–5 days of light exercise).

Conclusion

Increased deprivation, female gender, and little exercise were uniquely associated with chronic back pain. These characteristics may help clinicians to intervene to prevent acute backpain resulting in chronic cases.

Trunk coupling in LBP

J Orthop Sports Phys Ther. 2019 May 15:1-41. doi: 10.2519/jospt.2019.8756.

Reduced Trunk Coupling in Persons With Recurrent Low Back Pain Is Associated With Greater Deep-to-Superficial Trunk Muscle Activation Ratios During the Balance-Dexterity Task.

Rowley KM¹, Smith JA², Kulig K¹.

STUDY DESIGN:

Cross-sectional controlled laboratory study.

BACKGROUND:

Motor control dysfunction persisting during symptom remission in persons with recurrent low back pain (rLBP) may contribute to the recurrence of pain..

OBJECTIVES:

The purpose was to investigate trunk control in persons in remission from rLBP and back-healthy controls using a dynamic, internally-driven balance task. No differences in task performance were expected between groups, but it was hypothesized persons with rLBP would exhibit greater trunk coupling consistent with a trunk stiffening strategy.

METHODS:

Persons with and without rLBP (n=19/group) completed the Balance-Dexterity Task, which involved balancing on one limb in standing while compressing an unstable spring with the other. Task performance measures included center-of-pressure velocity under the stance limb and vertical force variability under the spring. Trunk coupling was quantified with the coefficient of determination (R^2) of an angle-angle plot of thorax-pelvis frontal-plane motion. Fine-wire and surface electromyography captured activations of paraspinals and abdominals.

RESULTS:

There were no differences between groups for any task performance measure. The group in remission from rLBP exhibited reduced trunk coupling, or more dissociated thorax and pelvis motion, compared to back-healthy controls ($p=0.024$). Trunk coupling in this group was associated moderately with lumbar multifidus-to-erector spinae activation ratio ($R=0.618$, $p=0.006$) and weakly with internal-to-external oblique ratio ($R=0.476$, $p=0.046$).

CONCLUSION:

The Balance-Dexterity Task is a submaximal, internally-driven unstable balance task during which more dissociated trunk motion was observed in persons in remission from rLBP. Findings underscore the task-dependent nature of trunk control research and assessment in persons with rLBP. *J Orthop Sports Phys Ther, Epub 15 May 2019. doi:10.2519/jospt.2019.8756.*

LBP among Marines – lack of exercise

A longitudinal observational study of back pain incidence, risk factors and occupational physical activity in Swedish marine trainees

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Objectives To evaluate the occurrence of low back pain (LBP) and LBP that limits work ability, to identify their potential early risks and to quantify occupational physical activity in Swedish Armed Forces (SwAF) marines during their basic 4 month marine training course.

Design Prospective observational cohort study with weekly follow-ups.

Participants Fifty-three SwAF marines entering the training course.

Outcomes Incident of LBP and its related effect on work-ability and associated early risks. Occupational physical activity, as monitored using accelerometers and self-reports.

Results During the training course, 68% of the marines experienced at least one episode of LBP. This yielded a LBP and LBP limiting work ability incidence rate of 13.5 (95% CI 10.4 to 17.8) and 6.3 (95% CI 4.2 to 10.0) episodes per 1000 person-days, respectively. Previous back pain and shorter body height (≤ 1.80 m) emerged as independent risks for LBP (HR 2.5, 95% CI 1.4 to 4.3; HR 2.0, 95% CI 1.2 to 3.3, respectively), as well as for LBP that limited work ability (HR 3.6, 95% CI 1.4 to 8.9; HR 4.5, 95% CI 2.0 to 10.0, respectively). Furthermore, managing fewer than four pull-ups emerged as a risk for LBP (HR 1.9, 95% CI 1.2 to 3.0), while physical training of fewer than three sessions per week emerged as a risk for LBP that limited work ability (HR 3.0, 95% CI 1.2 to 7.4). More than 80% of the work time measured was spent performing low levels of ambulation, however, combat equipment (≥ 17.5 kg) was carried for more than half of the work time.

Conclusions Incidents of LBP are common in SwAF marines' early careers. The link between LBP and previous pain as well as low levels of exercise highlights the need for preventive actions early on in a marine's career. The role of body height on LBP needs further investigation, including its relationship with body-worn equipment, before it can effectively contribute to LBP prevention.

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<http://dx.doi.org/10.1136/bmjopen-2018-025150>

7. PELVIC ORGANS/WOMAN'S HEALTH

Increase fetal risk with mom's with migraine's

Pregnancy, Birth, Neonatal, and Postnatal Neurological Outcomes After Pregnancy With Migraine

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Headache doi: 10.1111/head.13536

Background.—Prevalence of migraine is high during the reproductive age. Although migraine often improves during pregnancy, the risk of adverse pregnancy, birth, neonatal, and neurological outcomes in mother and offspring remains poorly understood.

Objective.—To investigate the associations between maternal migraine and risks of adverse pregnancy outcomes in the mother, and birth, neonatal and postnatal outcomes in the offspring.

Methods.—We used Danish population registries to assemble a cohort of pregnancies among women with migraine and an age- and conception year-matched comparison cohort of pregnancies among women without migraine. The study period was 2005-2012. We computed adjusted prevalence ratios (aPRs) for pregnancy and birth outcomes and adjusted risk ratios (aRRs) for neonatal and postnatal outcomes, adjusting for age, preconception medical history, and preconception reproductive history.

Results.—We identified 22,841 pregnancies among women with migraine and 228,324 matched pregnancies among women without migraine. Migraine was associated with an increased risk of pregnancy-associated hypertension disorders (aPR: 1.50 [95% confidence interval (CI): 1.39-1.61]) and miscarriage (aPR: 1.10 [95% CI: 1.05-1.15]). Migraine was associated with an increased prevalence of low birth weight (aPR: 1.14 [95% CI: 1.06-1.23]), preterm birth (aPR: 1.21 [95% CI: 1.13-1.30]) and cesarean delivery (aPR: 1.20 [95% CI: 1.15-1.25]), but not of small for gestational age offspring (aPR: 0.94 [95% CI: 0.88-0.99]) and birth defects (aPR: 1.01 [95% CI: 0.93-1.09]). Offspring prenatally exposed to maternal migraine had elevated risks of several outcomes in the neonatal and postnatal period, including intensive care unit admission (aRR: 1.22 [95% CI: 1.03-1.45]), hospitalization (aRR: 1.12 [95% CI: 1.06-1.18]), dispensed prescriptions (aRR: 1.34 [95% CI: 1.24-1.45]), respiratory distress syndrome (aRR: 1.20 [95% CI: 1.02-1.42]), and febrile seizures (aRR: 1.27 [95% CI: 1.03-1.57]), but not of death (aRR: 0.67 [95% CI: 0.43-1.04]) and cerebral palsy (aRR: 1.00 [95% CI: 0.51-1.94]).

Conclusions.—Women with migraine and their offspring have greater risks of several adverse pregnancy outcomes than women without migraine.

Key words: migraine, pregnancy, headache, pregnancy outcomes, Headache doi: 10.1111/head.13536© 2019 American Headache Society Published by Wiley Periodicals, Inc.

Vit D and infant Diabetes

Diabetes Obes Metab. 2019 Apr 17. doi: 10.1111/dom.13748.

Vitamin D status during pregnancy and the risk of gestational diabetes mellitus: A longitudinal study in a multiracial cohort.

Xia J¹, Song Y¹, Rawal S^{2,3}, Wu J⁴, Hinkle SN², Tsai MY⁵, Zhang C².

AIM:

To prospectively and longitudinally investigate vitamin D status during early to mid-pregnancy in relation to gestational diabetes mellitus (GDM) risk.

METHODS:

In a nested case-control study of 107 GDM cases and 214 controls within the Fetal Growth Studies-Singleton Cohort, plasma levels of 25-hydroxyvitamin D2 and D3 (25(OH)D) and vitamin D binding protein were measured at gestational weeks 10 to 14, 15 to 26, 23 to 31, and 33 to 39; we further calculated total, free, and bioavailable 25(OH)D. Conditional logistic regression models and linear mixed-effects models were used.

RESULTS:

We observed a threshold effect for the relation of vitamin D biomarkers with GDM risk. Vitamin D deficiency (<50 nmol/L) at 10 to 14 gestational weeks was associated with a 2.82-fold increased risk for GDM [odds ratio (OR) = 2.82, 95% confidence interval (CI): 1.15-6.93]. Women with persistent vitamin D deficiency at 10 to 14 and 15 to 26 weeks of gestation had a 4.46-fold elevated risk for GDM compared with women persistently non-deficient (OR = 4.46, 95% CI: 1.15-17.3).

CONCLUSIONS:

Maternal vitamin D deficiency as early as the first trimester of pregnancy was associated with an elevated risk of GDM. The association was stronger for women who were persistently deficient through the second trimester. Assessment of vitamin D status in early pregnancy may be clinically important and valuable for improving risk stratification and developing effective interventions for the primary prevention of GDM.

8. VISCERA

Glucosamine may reduce CV risk

Association of habitual glucosamine use with risk of cardiovascular disease: prospective study in UK Biobank

BMJ 2019; 365 doi: <https://doi.org/10.1136/bmj.11628> (Published 14 May 2019) Cite this as: *BMJ* 2019;365:11628 Hao Ma, PhD candidate¹², Xiang Li, PhD candidate¹, Dianjianyi Sun, postdoctoral fellow¹, Tao Zhou, postdoctoral fellow¹, Sylvia H Ley, assistant professor¹³⁴, Jeanette Gustat, clinical associate professor¹, Yoriko Heianza, postdoctoral fellow¹, Lu Qi, professor¹³⁴

Abstract

Objective To prospectively assess the association of habitual glucosamine use with risk of cardiovascular disease (CVD) events.

Design Prospective cohort study.

Setting UK Biobank.

Participants 466 039 participants without CVD at baseline who completed a questionnaire on supplement use, which included glucosamine. These participants were enrolled from 2006 to 2010 and were followed up to 2016.

Main outcome measures Incident CVD events, including CVD death, coronary heart disease, and stroke.

Results During a median follow-up of seven years, there were 10 204 incident CVD events, 3060 CVD deaths, 5745 coronary heart disease events, and 3263 stroke events. After adjustment for age, sex, body mass index, race, lifestyle factors, dietary intakes, drug use, and other supplement use, glucosamine use was associated with a significantly lower risk of total CVD events (hazard ratio 0.85, 95% confidence interval 0.80 to 0.90), CVD death (0.78, 0.70 to 0.87), coronary heart disease (0.82, 0.76 to 0.88), and stroke (0.91, 0.83 to 1.00).

Conclusion Habitual use of glucosamine supplement to relieve osteoarthritis pain might also be related to lower risks of CVD events.

Memory problems with anaesthesia linked to intestinal dysbacteriosis**Intestinal dysbacteriosis mediates the reference memory deficit induced by anaesthesia/surgery in aged mice**

panel X.L.Jiang^{a1} X.Y.Gu^{a1} X.X.Zhou^a X.M.Chen^a X.Zhang^a Y.T.Yang^b Y.Qin^a L.Shen^c W.F.Yu^a D.S.Su^a

<https://doi.org/10.1016/j.bbi.2019.05.006> Get rights and content

Highlights

- Anaesthesia/surgery altered the gut microbiome in aged mice.
- Dysbacteriosis induced by anaesthesia/surgery impaired reference memory in aged mice.
- Probiotics alleviated reference memory impairment induced by anaesthesia/surgery.

Background Postoperative cognitive dysfunction (POCD) is associated with increased morbidity and mortality and has become a major concern for patients and caregivers. POCD is most common in older patients. Previous studies demonstrated that the gut microbiome affects cognitive function and behaviour, and perioperative factors, including the operation itself, antibiotics, opioids or acid-inducing drugs, affect the gut microbiome. Thus, we hypothesised that intestinal dysbacteriosis caused by anaesthesia/surgery induces POCD.

Methods Tibial fracture internal fixation was performed in 18-month-old C57BL/6 mice under isoflurane anaesthesia to establish the POCD model. The Morris water maze was used to measure reference memory after anaesthesia/surgery. High-throughput sequencing of 16S rRNA from faecal samples was used to investigate changes in the abundance of intestinal bacteria after anaesthesia/surgery. To confirm the role of the gut microbiome in POCD, we pretreated mice with compound antibiotics or mixed probiotics (VSL#3). Anaesthesia/surgery impaired reference memory and induced intestinal dysbacteriosis in aged mice.

Results The 16S rRNA sequencing data revealed 37 genera (18 families) of bacteria that changed in abundance after anaesthesia/surgery. Pretreating mice with compound antibiotics or mixed probiotics (VSL#3) prevented the learning and memory deficits induced by anaesthesia/surgery. We further conducted quantitative real-time polymerase chain reaction (qRT-PCR) of 22 common types of bacteria among the 37 total types to verify the results of bacterial flora changes after anaesthesia/surgery. Numbers of 8 types of bacteria changed after anaesthesia/surgery but returned to normal after treatment with a mix of probiotics.

Conclusions Our data suggest that deficits in reference memory induced by anaesthesia/surgery are mediated by intestinal dysbacteriosis.

Pediatric IBS and increase CA rates**The incidence of cancer and mortality in paediatric onset inflammatory bowel disease in Denmark and Finland during a 23-year period: a population-based study**

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Kaija-Leena Kolho Vibeke Wewer

<https://doi.org/10.1111/apt.15258>

Background

Recent studies report increased risks of both cancer and mortality in paediatric onset inflammatory bowel disease (pIBD) but the reproducibility of this is unknown.

Aim

In this population-based study we aim to estimate the risk of cancer and mortality in the Danish and Finnish pIBD population in a 23-year period compared to the general population.

Methods

The pIBD population was defined as individuals registered in the national patient registries with a diagnosis of Crohn's disease (CD), ulcerative colitis (UC) or IBD-unclassified before their 18th birthday from 1992 to 2014. This cohort was cross referenced with the national cancer and mortality registries identifying all pIBD patients who subsequently developed cancer and/ or died and followed up to the end of 2014. Risk estimates are presented as standardised incidence ratios calculated based on incidence figures from the populations.

Results

Six thousand six hundred and eight-nine patients with pIBD were identified (median age at follow-up 22.3 years; median follow-up: 9.6 years [interquartile range: 4.8-16.0]). Seventy-two subsequently developed cancer and 65 died. The standardised incidence ratio of cancer in general was 2.6 (95% CI: 1.8-3.7) and 2.5 (95% CI: 1.8-3.4) in CD and UC, respectively. The standardised mortality ratios were 2.2 (95% CI: 1.4-3.4) and 3.7 (95% CI: 2.7-5.0) in CD and UC, respectively. The leading causes for mortality were cancer, suicide and infections.

Costs of IBS

Economic burden of moderate to severe irritable bowel syndrome with constipation in six European countries

BMC Gastroenterology

Tack J, et al. | May 09, 2019

Researchers in six European countries (France, Germany, Italy, Spain, Sweden and the UK) evaluated the economic burden of moderate to severe irritable bowel syndrome with predominant constipation (IBS-C). Included were 525 patients, 60% suffering from severe IBS-C. Data reported that the mean annual direct cost to the healthcare systems was €937.1- €2108.0 and the total direct cost (combined costs to healthcare systems and patient) for IBS-C was €1421.7- €2487.1.

Findings revealed that IBS-C is not a life-threatening condition, but it has a significant impact on healthcare systems and society. Direct and indirect costs were high for moderate to severe IBS-C, with hospitalizations/emergency room visits being the largest direct cost driver.

13 B. TMJ/ORAL

Testing for fluoride

Big toenail and hair samples as biomarkers for fluoride exposure – A pilot study

BMC Oral Health

Elekdag-Turk S, et al. | May 15, 2019

Because biomarkers (ie, biological markers) can help in the detection and prevention of clinical disease by recognizing changes in biological samples, researchers intended to determine whether there is an association between fluoride concentrations in big toenail (hallux) clippings, hair and the level of fluoride in the water of an endemic and non-endemic fluorosis region. In this case-control study, a total of 48 candidates were involved from an endemic and a non-endemic fluorosis region.

According to results, the mean concentration of fluoride in the endemic region of big toenail and hair was significantly higher than the mean concentration of big toenail and hair in the non-endemic region. There is greater observed accuracy in the fluoride assay for big toenails than the fluoride assay for hair. Based on the data from this pilot study, nail and hair samples can be used as biomarkers to detect exposure to biological fluoride. However, hair as a biomarker is less sensitive and specific when comparing the area under the curve values of big toenail and hair samples.

Periodontal disease and HA's

J Periodontol. 2019 May 9. doi: 10.1002/JPER.19-0051.

Periodontal inflammation is related to increased serum calcitonin gene-related peptide (CGRP) levels in patients with chronic migraine.

Leira Y^{1,2,3}, Ameijeira P², Domínguez C⁴, López-Arias E⁵, Ávila P⁵, Pérez-Mato M⁵, Sobrino T⁵, Campos F⁵, D'Aiuto F¹, Leira R^{4,5}, Blanco J^{2,3}.

BACKGROUND:

Recently, a relationship was found between periodontitis and chronic migraine. Calcitonin gene-related peptide (CGRP) is a key element in migraine pathophysiology. However, no information exists of the potential association between periodontal inflammation and CGRP in chronic migraine. The aim of the study was, therefore, to investigate whether there is a link between periodontitis and peripheral levels of CGRP in a cohort of patients with chronic migraine.

METHODS:

We included 102 chronic migraineurs and 77 age and gender matched individuals free of headache/migraine. Full-mouth periodontal parameters were recorded and the periodontal inflamed surface area (PISA) was calculated to quantify the periodontal inflammatory status for each participant. Socio-demographic data and co-morbidities were assessed by means of a standard questionnaire. We collected blood samples and serum concentrations were done for CGRP, interleukin (IL)-6 and IL-10.

RESULTS:

In the chronic migraine group, patients with periodontitis had greater levels of serum CGRP (19.7±6.5 vs. 15.3±6.2 pg/mL) and IL-6 (15.1±9.2 vs. 9.6±6.3 pg/mL, P<0.0001) while non-significant differences were observed with IL-10 (2.0±1.0 vs. 2.8±1.5 pg/mL, P = 0.675) concentrations than those without periodontitis. PISA was independently associated with CGRP in patients with chronic migraine ($\beta = 0.003$; 95%CI: 0.001-0.006, P = 0.031). PISA correlated positively with CGRP (r = 0.236; P = 0.017) and IL-6 (r = 0.262; P = 0.008) in chronic migraine.

CONCLUSIONS:

Periodontal inflammation is associated with increased circulating levels of CGRP in chronic migraineurs. Elucidating the exact mechanisms through which periodontitis and CGRP are linked in these patients deserves further investigation. This article is protected by copyright. All rights reserved.

13 D. SLEEP**OA and insomnia**

Arthritis Care Res (Hoboken). 2018 Aug 1. doi: 10.1002/acr.23695.

Effects of Osteoarthritis Pain and Concurrent Insomnia and Depression on Health Care Use in a Primary Care Population of Older Adults.

Liu M¹, McCurry SM², Belza B², Dobra A², Buchanan DT², Vitiello MV², Von Korff M³.

OBJECTIVE:

To examine independent and combined effects of pain with concurrent insomnia and depression symptoms on the use of health care services in older adults with osteoarthritis (OA).

METHODS:

Patients were Group Health Cooperative (GHC) patients with a primary diagnosis of OA (n = 2,976). We used survey data on pain (Graded Chronic Pain Scale), insomnia (Insomnia Severity Index), and depression (Patient Health Questionnaire-8), and health care use extracted from GHC electronic health records (office visits, length of stay, outpatient and inpatient costs, and hip or knee replacement) for 3 years after the survey. Negative binomial, logistic, and generalized linear models were used to assess predictors of health care use.

RESULTS:

Approximately 34% and 29% of patients displayed at least subclinical insomnia and at least subclinical depression symptoms, respectively, in addition to moderate-to-severe pain. Pain had the greatest independent effects on increasing all types of health care use, followed by depression (moderate effects) on increased office visits, length of stay, outpatient and inpatient costs, and insomnia (mild effects) on decreased length of stay. No synergistic effects of the 3 symptoms on use of health care services were observed. The combined effects of pain plus insomnia and pain plus depression were significant for all types of health care use and increased greatly with increasing severity of insomnia and depression, except for hip/knee replacement.

CONCLUSION:

Pain is the main driver for health care use in patients with OA. In addition to pain, insomnia plus depression jointly increased diverse types of health care use, and these combined effects increased greatly with increasing severity of insomnia and depression. These findings indicate the important role that concurrent symptomatic conditions may play in increasing use of health care services.

16. CONCUSSIONS**Different head stabilizing strategies between men and women**

J Orthop Sports Phys Ther. 2019 May 15:1-26. doi: 10.2519/jospt.2019.8760.

Women and Men Use Different Strategies to Stabilize the Head in Response to Impulsive Loads: Implications for Concussion Injury Risk.

Alsalaheen B^{1,2,3}, McCloskey K¹, Bean R¹, Almeida A^{2,3}, Eckner J^{4,3}, Lorincz M^{2,3}.

STUDY DESIGN:

Descriptive cross-sectional study.

BACKGROUND:

Cervical musculoskeletal and neuromuscular attributes, which may vary between men and women, influence an individual's capacity to stabilize their head.

OBJECTIVES:

To examine sex differences in cervical musculoskeletal and neuromuscular attributes and their impact on head stability. The secondary objective was to examine the effects of anticipation and preload on head kinematics.

METHODS:

Thirty-four (20 men, 14 women) recreationally-active adult athletes completed a perturbation protocol with anticipation and preloading conditions. We assessed the neuromuscular response of the sternocleidomastoid to perturbation and the head kinematics. We measured neck girth, sternocleidomastoid physiological cross-sectional area (PCSA), and isometric strength.

RESULTS:

Women had smaller neck girth, smaller sternocleidomastoid PCSA, and lower isometric strength than men. Women had greater baseline electromyography (EMG) amplitude, and greater peak EMG response than men. There were no sex differences in sternocleidomastoid onset latency or head kinematics. Women had a greater increase in baseline EMG amplitude after introducing preload and under anticipated conditions. Preload attenuated sex differences in muscle onset latency. Across the sexes, there was a significant main effect of anticipation on head kinematics.

CONCLUSION:

Men and women used different strategies to stabilize the head, and responded differently to the addition of preload and anticipation. *J Orthop Sports Phys Ther, Epub 15 May 2019.*
doi:10.2519/jospt.2019.8760.

37. OSTEOARTHRITIS/KNEE**Ankle dysfunction in knee OA****The effect of varus knee deformities on the ankle alignment in patients with knee osteoarthritis**

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Journal of Orthopaedic Surgery and Research 2019;14:134

<https://doi.org/10.1186/s13018-019-1191-0>

Background

We evaluated the compensatory change in ankle alignment due to knee malalignment and its relationship with varus knee deformities, as well as sex differences in compensation.

Methods

From October 2016 to September 2017, 103 patients with end-stage knee osteoarthritis underwent primary total knee arthroplasty (TKA). Ninety-five knees (78 patients) were included. The hip-knee-ankle angle (HKA) and ankle alignment and tilt were evaluated with full-leg standing anteroposterior radiographs. The ankle alignment was estimated according to the tibiotalar angle, tibial anterior surface angle (TAS), and lateral distal tibial angle. The talar tilt angle (TT), anatomical talocrural angle, angle between the tibial plateau and distal tibial plafond, angles between the ground and distal tibial plafond, and angles between the ground and upper talus were measured to evaluate ankle tilt. The patients were separated into two sex-based groups; correlations between the HKA and ankle parameters were estimated.

Results

The mean HKA in men and women was $8.16 \pm 4.36^\circ$ and $7.69 \pm 5.93^\circ$, respectively. The relative tilt of the talus and distal tibia plafond to the ground was increased when varus knee deformities progressed. In women, there was a positive correlation between the knee alignment and TAS ($r = -0.295$, $p = 0.016$). As the knee mechanical axis became more varus, the distal tibia plafond became more valgus. In women, a negative correlation was observed between the HKA and TT ($r = -0.359$, $p = 0.003$). Compensatory changes in the ankle alignment and TT to knee alignment were not observed in men.

Conclusion

Compensatory ankle changes should be considered before TKA.

Inflammatory factors in OA

The ratio adipsin/MCP-1 is strongly associated with structural changes and CRP/MCP-1 with symptoms in obese knee osteoarthritis subjects: Data from the Osteoarthritis Initiative

Osteoarthritis and Cartilage

Martel-Pelletier J, et al. | May 17, 2019

Researchers investigated the associative value of a panel of adipokines and some related inflammatory factors alone at assessing cartilage volume loss over time and symptoms in obese (High BMI) and non-obese (Low BMI) osteoarthritis (OA) subjects. From the Osteoarthritis Initiative Progression subcohort, they assessed human OA serum to study their levels of the nine biomarkers and their ratios (36).

Findings revealed that the cartilage volume loss over time in the lateral compartment was associated with the ratio adipsin/MCP-1 and that CRP/MCP-1 was associated with symptoms in obese OA subjects. Findings thereby highlight the significance of ratios as biomarkers to a stronger association to OA progression and symptoms.

41 A. ACHILLES TENDON AND CALF**Vibration therapy assist Achilles repair****Acute and long-term effects of mechanotherapy on the outcome after an Achilles repair: A prospective cohort study with historical controls**

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DOI: <https://doi.org/10.1016/j.apmr.2019.03.021>

Objectives

To evaluate the effects of vibration on Achilles tendon microcirculation and characteristics following surgical repair of Achilles tendon rupture.

Design

Cohort study with historical controls.

Setting

A university institute.

Participants

Thirty-two participants, including nineteen [16 male, three female; median (range) age: 43.0 (25.0 – 57.0) years] and thirteen [10 male, three female; 44.00 (29.0 – 60.0) years] in the vibration (application to the ball of the foot, 30 hertz, 2 mm amplitude, 4 kg pressure, and self-administration) and control groups, respectively, who underwent unilateral Achilles tendon repairs were recruited.

Intervention

A four-week vibration intervention in the vibration group.

Main Outcome Measurements

The tendon microcirculation was measured after the first session of vibration. The participants were evaluated repeatedly with bilateral follow-up measurements of tendon stiffness, three functional outcome tests, and a questionnaire survey.

Results

Acute effects of the vibration were observed immediately after the five-minute vibration ($P \leq 0.001$). Lower total hemoglobin and oxygen saturation were respectively observed ($P = .043$) in the repaired legs three and six months postsurgery in the vibration group as compared with the control group. The vibration group also showed greater tendon stiffness, heel raising height and hopping distance three or six months postoperation in both the repaired and non-injured legs (all $P < .05$). The microcirculatory characteristics two months postoperation were correlated with the outcomes at six months postoperation.

Conclusions

Differences in microcirculatory characteristics and better rehabilitation outcomes were observed in the legs with an Achilles repair that underwent the early vibration intervention.

45 A. MANUAL THERAPY LUMBAR & GENERAL

Is it all about the Brain?

Spinal manipulation therapy: is it all about the brain? A current review of the neurophysiological effects of manipulation

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Abstract

Spinal manipulation has been an effective intervention for the management of various musculoskeletal disorders.

However, the mechanisms underlying the pain modulatory effects of spinal manipulation remain elusive. Although both biomechanical and neurophysiological phenomena have been thought to play a role in the observed clinical effects of spinal manipulation, a growing number of recent studies have indicated peripheral, spinal and supraspinal mechanisms of manipulation and suggested that the improved clinical outcomes are largely of neurophysiological origin. In this article, we reviewed the relevance of various neurophysiological theories with respect to the findings of mechanistic studies that demonstrated neural responses following spinal manipulation. This article also discussed whether these neural responses are associated with the possible neurophysiological mechanisms of spinal manipulation.

The body of literature reviewed herein suggested some clear neurophysiological changes following spinal manipulation, which include neural plastic changes, alteration in motor neuron excitability, increase in cortical drive and many more. However, the clinical relevance of these changes in relation to the mechanisms that underlie the effectiveness of spinal manipulation is still unclear. In addition, there were some major methodological flaws in many of the reviewed studies.

Future mechanistic studies should have an appropriate study design and methodology and should plan for a long-term follow-up in order to determine the clinical significance of the neural responses evoked following spinal manipulation.

50 A. MOTOR CONTROL**LBP motor control**

J Orthop Sports Phys Ther. 2019 May 15:1-62. doi: 10.2519/jospt.2019.8451.

Convergence and Divergence Between Exercise Based Approaches for Management of Low Back Pain That Consider Motor Control.

Hides J^{1,2}, Donelson R³, Lee D⁴, Prather H⁵, Sahrman S⁶, Hodges PW⁷.

Many approaches for low back pain (LBP) management focus on modifying motor control, which refers to motor, sensory and central processes for control of posture and movement. A common assumption across approaches is that the manner an individual loads the spine by their typical postures, movements and muscle activation strategies, contributes to symptom onset, persistence, and recovery.

However, there are also divergent features. This commentary presents key principles of four clinical physical therapy approaches that include consideration of motor control in LBP management, considers their convergence and divergence, and discusses their interface with medical LBP management. The approaches considered are *Movement System Impairments*; *Mechanical Diagnosis and Therapy*; *Motor Control Training*, and *Integrated Systems Model*.

These were selected to represent some of the diversity of applications, including; approaches with motor control as a central versus adjunct feature, and approaches that are evidence-based versus evidence-informed. Identification of areas of convergence and divergence of approaches is designed to clarify key aspects of each approach as a guide for the clinician and to provide a platform for considering a hybrid approach tailored to the individual patient. *J Orthop Sports Phys Ther*, Epub 15 May 2019. doi:10.2519/jospt.2019.8451.

59. PAIN**Central sensitization in hand OA**

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Peripheral and Central Sensitization of Pain in Individuals With Hand Osteoarthritis and Associations With Self- Reported Pain

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Pain sensitization, an important osteoarthritis (OA) pain mechanism, has not been substantially investigated in patients with hand OA. It is unknown how peripheral and central sensitization are related to self-reported hand pain.

Methods. Individuals with verified hand OA in the Norwegian Hand study underwent quantitative sensory testing of pressure pain thresholds (PPTs) locally (painful and nonpainful finger joints) and remotely (wrist, trapezius, and tibialis anterior muscles), and testing of temporal summation (TS), a manifestation of central sensitization. We examined cross-sectional associations of PPT tertiles and TS with hand pain using the Numerical Rating Scale (NRS) (range 0–10) and the Australian/Canadian Osteoarthritis Hand Index (AUSCAN) pain subscale (range 0–20). Linear regression models were adjusted for demographics, psychosocial factors, and radiographic severity.

Results. This study included 282 participants (88% female) with a median age of 61 years (interquartile range [IQR] 57–66). Participants with the lowest PPTs in their finger joints and in most remote locations reported higher NRS pain values, compared to patients with the highest PPTs, with adjusted β values ranging from 0.6 (95% confidence interval [95% CI] 0.0, 1.2) to 0.9 (95% CI 0.3, 1.5). The 118 participants (42%) with TS reported higher mean \pm SD NRS pain values compared to those without TS (4.1 ± 2.4 versus 3.1 ± 1.7 ; adjusted $\beta = 0.6$ [95% CI 0.2, 1.1]). Neither PPTs nor the presence of TS were associated with AUSCAN pain.

Conclusion. Central sensitization was common in patients with hand OA. Lower local and widespread PPTs and the presence of TS were associated with higher hand pain intensity, even after adjustment for demographics, psychosocial factors, and radiographic severity. Sensitization may therefore represent a possible treatment target