Foot & Ankle Research Review™

Making Education Easy

Issue 24 – 2015

In this issue:

Abbreviations used in this issue

OR = odds ratio
RA = rheumatoid arthritis
SLE = systemic lupus erythematosus
SpA = spondyloarthropathy

Welcome to the latest issue of Foot and Ankle Research Review.

In this issue I have reviewed the latest research from the Australasian Podiatry Conference that was held on the Gold Coast in Australia, in May this year. I am delighted to include ten presentations from New Zealand and include work related to diabetes (Ihaka B: Soft tissue changes in the foot of people with diabetes), gout (Frecklington M: The effect of good and poor walking shoe characteristics on plantar pressure and gait in people with gout; Stewart S: The first metatarsophalangeal joint in gout and asymptomatic hyperuricaemia), inflammatory arthritis (Carroll M: Systematic review of the assessment of inflammatory and structural lesions of the Achilles tendon by ultrasound imaging in inflammatory arthritis: a systematic review and meta-analysis), rheumatoid arthritis (Brenton-Rule: Foot and ankle characteristics associated with falls in adults with rheumatoid arthritis), systemic lupus erythematosus (Otter S: Epidemiology and podiatric management of foot complaints in systemic lupus erythematosus), multiple sclerosis (Rome K: Textured insoles: do they have a role in the management of long-term chronic foot conditions) and footwear in inflammatory arthritis (Barr G: An evaluation of seasonal variations in footwear worn by adults with inflammatory arthritis).

I hope you enjoy reading the latest issue and any feedback is most welcome.

Kind Regards,

Professor Keith Rome
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An evaluation of seasonal variations in footwear worn by adults with inflammatory arthritis

Authors: Barr G et al.

Summary: This cross-sectional New Zealand study used a web-based survey of 197 participants (predominantly European women aged 46-65 years) to evaluate seasonal footwear preferences in adults with inflammatory arthritis. Most participants had rheumatoid arthritis (35%) and/or osteoarthritis (57%), with 68% reporting disease duration >5 years. The most popular footwear styles, regardless of seasonal variation, were athletic and walking shoes. During summer, people with inflammatory arthritis more frequently wear sandals to accommodate disease-related foot deformity.

Comment: The presentation reviewed seasonal variations in footwear choice in people with inflammatory arthritis. The study was undertaken using the Arthritis NZ website and the main findings reported that both athletic and walking shoes were worn regardless of the season. The study was based upon a previous footwear study conducted in Auckland and therefore limited the generalisability of the results. The presenter reported that a richness of information was obtained from an open-ended question and many respondents described their frustrations in finding appropriate footwear in New Zealand. In some instances respondents reported buying footwear from overseas. Future directions were reported that included evaluating a range of commercially available shoes for comfort, fit and support in people with inflammatory arthritis.

Foot and ankle characteristics associated with falls in adults with rheumatoid arthritis

Authors: Brenton-Rule A et al.

Summary: To study falls in adults with rheumatoid arthritis, 201 patients were recruited, 119 (59%) of whom reported at least one fall in the preceding 12 months. When compared to 'non-fallers', 'fallers' had experienced longer mean disease duration, and had more comorbid conditions, a slower gait speed, a higher midfoot peak plantar pressure and were more likely to have a history of stroke. Fallers also had greater difficulty with activities of daily living, a greater fear of falling and greater self-reported foot impairment. Using a logistic regression analysis, and including age, sex and all other variables with a $p < 0.15$ in univariate analysis, fall in the preceding 12 months was independently associated with increased midfoot peak plantar pressures (OR 1.12 for each 20kPa increase) and self-reported foot impairment (OR 1.16 for each 3 point increase).

Comment: Falls in older adults are a major problem in New Zealand, with devastating consequences not only to people but also to the health system. Recent studies have indicated that foot and ankle characteristics contribute to falls in older adults. However, the evidence is limited in people with established rheumatoid arthritis. The findings of the study suggest that high peak plantar pressures and foot impairment are associated with falls in this population. Although the study highlighted the issues of falls, the authors indicated that further work is needed over a longer time frame rather than evaluating individuals at one time point. From a clinical perspective, the authors suggested that clinicians should include assessing the foot for deformity, function and impairment as routine practice for this high-risk group.

Podiatrists Board of New Zealand

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The effect of good and poor walking shoe characteristics on plantar pressure and gait in people with gout

Authors: Frecklington M et al.

Summary: In a cross-sectional repeated measures study, the effects on plantar pressure and gait of good and poor walking shoes were examined in 36 participants with gout. Compared to participants own shoes, footwear with good characteristics had lower peak pressure at 3rd ($p = 0.003$) and 5th metatarsals ($p = 0.001$), reduced the pressure-time integral beneath the heel ($p \leq 0.001$) and metatarsals 3 ($p \leq 0.001$) and 5 ($p = 0.0048$), and increased the pressure-time integral beneath the midfoot ($p \leq 0.001$).The footwear with poor characteristics increased peak pressure beneath the heel ($p \leq 0.001$) and lesser toes ($p = 0.003$), reduced peak pressure at metatarsal 3 ($p = 0.004$) and reduced the pressure-time integral in the midfoot ($p = 0.003$). Both good and poor footwear increased walking velocity ($p \leq 0.001$), step length ($p \leq 0.001$), and stride length ($p \leq 0.001$) versus participants own shoes.

Comment: The study is part of a larger study evaluating good footwear in people with tophaceous gout. The authors found that good footwear characteristics change plantar pressure in comparison to poor footwear characteristics. Clinicians offer advice to people with gout and a good understanding of footwear characteristics is essential. The authors described what good characteristics are and included a rocker sole, good heel cushioning, mid-foot stability and sufficient width at the toe box. The presentation concluded that a 6-month clinical trial is being undertaken to evaluate the long term benefits of good footwear in people with gout.

Soft tissue changes in the foot of people with diabetes

Authors: Ihaka B et al.

Summary: A cross-sectional observational study was conducted on 36 participants (Māori with and without diabetes and non-Māori with and without diabetes) to study differences in the soft tissue of the foot. No significant demographic differences were observed among the four groups ($p > 0.05$). Plantar fascia thickness differed significantly between the groups. Post-hoc analysis showed significant differences between Māori with diabetes and non-Māori with no diabetes; and between non-Māori with diabetes and non-Māori with no diabetes. Peak plantar pressure differed between groups for the 2nd/3rd metatarsophalangeal joints and 4th/5th metatarsophalangeal joints, but no difference was observed for the 1st metatarsophalangeal joint. No significant differences in pressure-time integrals were found in the forefoot region. In Māori with diabetes, a significant relationship was observed between plantar fascia thickness and peak plantar pressure at the 4th/5th metatarsophalangeal joints.

Comment: Māori have poorer health outcomes compared to non-Māori and are over-represented in amputation and mortality rates in Aotearoa. There is limited knowledge on the biomechanical parameters of Māori feet with diabetes and peripheral neuropathy. This study on plantar fascia thickness and plantar pressure readings from the forefoot of Māori with diabetes gives an insight into biomechanical foot characteristics. The preliminary findings suggest Māori feet may differ from other populations. The presentation highlighted the lack of evidence relating to biomechanical characteristics and clinicians should consider ethnic differences when evaluating the foot during clinical evaluation. Future directions were presented including the evaluation of risk factors in the development of foot ulceration and foot lesions in Māori. Similarities were reported in other ethnic groups.

Foot problems in patients with systemic lupus erythematosus; under-reported and under-treated?

Authors: Otter S et al.

Summary: The aim of this study was to explore current management strategies in people with systemic lupus erythematosus. The majority (61%) had discussed their foot complaints with their rheumatologist (39% with family doctor), but only 33% had seen a podiatrist. Overall, hands/feet were examined with equal frequency; 33% of patients had difficulty with basic foot care. Only 23 (25%) patients received insoles and only 13 subjects were still wearing insoles. No patients received specialist footwear and foot surgery was rarely performed (n = 8).

Comment: The novel findings from this presentation will be of interest to clinicians who treat people with inflammatory arthritis and specifically a disease that affects women. A self-administered questionnaire found that people with lupus reported foot pain, but very little treatment was offered to them. Footwear was highlighted as a major problem, with difficulties in finding appropriate footwear and not knowing what to look for when purchasing shoes. The presentation highlighted a need for a specific management strategy for people with lupus. The authors reported that further studies into the foot and ankle characteristics in people with lupus are required. Current studies included a better understanding of the cutaneous manifestations of this condition. Foot complaints appear common in people with lupus and there is a large unmet need for foot care in such individuals. There is no clear rationale for common podiatric treatment modalities, but clinicians should consider the foot to be at 'risk'.

The first metatarsophalangeal joint in gout and hyperuricaemia

Authors: Stewart S et al.

Summary: This cross-sectional study aimed to identify characteristics of the first metatarsophalangeal joint (1MTP) in 25 males with gout and 29 males with asymptomatic hyperuricaemia by comparing them with 34 healthy controls. In comparison to control patients, males with gout had significantly lower 1MTP dorsiflexion, greater foot-related pain and disability, lower gait velocity, greater activity limitation, less lower limb function during activities of daily living and recreational activities, higher 1MTP plantar and dorsal temperature and greater midfoot peak pressure and pressure-time integrals. Males with asymptomatic hyperuricaemia had less lower-limb function during recreational activities, higher Foot-posture Index, greater midfoot peak pressure and pressure time integrals, greater first metatarsal peak pressure and greater heel pressure time integrals.

Comment: Gout is a painful arthritis associated with high serum urate levels (hyperuricaemia) and subsequent crystal deposition in joints. The presentation evaluated the characteristics of the 1MTP in people with gout and those with asymptomatic hyperuricaemia. This condition can be considered a precursor to the development of gout, but not all people with asymptomatic hyperuricaemia develop gout. The findings are interesting in that reduced lower limb function was found in the people with asymptomatic hyperuricaemia compared to age-matched controls. The presentation discussed factors that may contribute to the findings and included that people with gout do not undertake physical activity and could be related to obesity and sedentary lifestyles. Future work was described with evaluating findings from ultrasound measurements from the 1MTP with foot pain, impairment and disability. The presentation was awarded the best research paper of the conference.

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Epidemiology of foot complaints in systemic lupus erythematosus

Authors: Otter S et al.

Summary: This survey of 354 people with systemic lupus erythematosus aimed to determine the clinical features and symptoms of foot involvement from the patients' perspective. Among a total of 107 responses (mean age 52 years, mean duration of diagnosis 12 years) 79% reported foot pain caused by systemic lupus erythematosus with 50% reporting current foot pain; 64% reported that foot pain generally adversely affected their lives. All foot parts were affected, with the midfoot, hindfoot and ankles being the most troublesome; extra-articular features were also common. For 38% of respondents, foot pain stopped them sleeping, while 35% reported that foot pain negatively affected them emotionally. Only 27% of respondents reported that their social or family activities were never impacted by foot complaints.

Comment: The survey was conducted in three district health board areas in Auckland and involved 354 questionnaires sent to people with lupus. The questionnaire was developed by rheumatologists in the UK, but was validated for use in New Zealand. The results demonstrated that a high proportion of people with lupus suffered with foot pain, impairment and disability. Their quality of life was affected due to the foot pain and their sleep pattern was also disturbed. The study is unique as there is limited evidence about foot complaints in people with lupus. The presentation concluded that there is a high prevalence of foot disease in lupus, but further large observational studies are needed together with looking at differences between age- and sex-matched controls.

Independent commentary by Professor Keith Rome.

Keith was awarded a Diploma in Chiropody and Membership to the Society of Chiropodists and Podiatrists in 1979 and worked in the health service and private practice. He has worked in full-time academia within podiatry and physiotherapy since 1988. He was awarded a Bachelor of Science in Podiatry from the University of Westminster in 1989 and in 1990 a postgraduate diploma in Biomechanics from the University of Strathclyde.

In 1994, he was awarded a Master of Science Degree in Research Methodology for Physical Therapists from Kings College London and in 2000 was awarded a PhD from the University of Teesside, UK. He was promoted to a Reader in Musculoskeletal Rehabilitation in 2002, and in 2005 was appointed as Professor of Podiatric Rehabilitation at University of Teesside. In 2007 he was appointed a Professor in Podiatry to AUT University, New Zealand.

Keith is currently leading podiatric research at AUT University and his current research interests relate to chronic gout, rheumatoid arthritis and the effects of foot orthoses/footwear on postural stability in long-term chronic conditions.

The assessment of inflammatory and structural lesions of the Achilles tendon by ultrasound imaging in inflammatory arthritis: a systematic review and meta-analysis

Authors: Carroll M et al.

Summary: The aim of this systematic review and meta-analysis was to examine inflammatory and structural ultrasound lesions of the Achilles tendon in people with inflammatory arthritis compared to controls. Thirteen high to medium quality studies met the inclusion criteria. The majority of studies reported on ultrasound lesions in spondyloarthropathy (SpA), with limited evidence for other forms of inflammatory arthritis. The ultrasound lesions were not consistently defined with regard to Outcome Measures in Rheumatology Clinical Trials (OMERACT) definitions and numerous scoring systems were used across the majority of studies. The mean Achilles tendon thickness at the enthesis in people with SpA was 0.54 mm thicker with more frequent erosions in people with SpA and rheumatoid arthritis, compared to controls. There was no significant difference in the frequency of enthesophyte formation in people with SpA compared to controls.

Comment: Ultrasound is a highly sensitive, reliable and non-invasive tool which allows for the assessment of inflammatory and structural lesions of tendons and entheseal sites. The systematic review is an accumulation of previous work on looking at gait characteristics in people with inflammatory arthritis. The systematic review identified that a majority of studies reporting ultrasound lesions indicative of inflammation and structural damage were in SpA, but limited evidence relating to other forms of inflammatory arthritis. Consistent application of the OMERACT ultrasound definitions and scoring of ultrasound lesions is required in future studies of Achilles tendon disease in inflammatory arthritis.

Gait characteristics associated with the foot and ankle in inflammatory arthritis: a systematic review and meta-analysis

Authors: Carroll M et al.

Summary: This systematic review sought to determine differences in the spatiotemporal, foot and ankle kinematics, kinetic, peak plantar pressure and muscle activity parameters between healthy controls and patients with inflammatory arthritis. A total of 36 studies, with quality ranging from high to low, met inclusion criteria. The majority of studies reported changes in gait parameters in rheumatoid arthritis, characterised by decreases in walking speed, cadence, stride length and ankle power, and increases in double-limb support time and peak plantar pressures at the forefoot. Walking velocity was reduced in patients with psoriatic arthritis and gout with no differences observed in patients with ankylosing spondylitis. No studies were found in patients with polymyalgia rheumatica, systemic sclerosis or systemic lupus erythematosus.

Comment: Gait analysis is increasingly being used to characterise dysfunction of the lower limb and foot in people with inflammatory arthritis. The review identified the majority of studies reporting gait adaptations in rheumatoid arthritis, but limited evidence reported parameters for other inflammatory arthritic conditions. Poor data reporting, small sample sizes and heterogeneity across inflammatory arthritis conditions limit the interpretation of the findings. Future studies may consider a standardised analytical approach to gait analysis that will provide clinicians and researchers with objective evidence of foot function in people with inflammatory arthritis.

The role of textured insoles in the management of long-term chronic conditions

Authors: Rome K et al.

Summary/Comment This invited presentation discussed the latest evidence related to the use of textured insoles in long-term chronic conditions and their potential use in everyday clinical practice as a low-cost means of improving postural stability in high falls-risk groups. Health care professionals frequently prescribe footwear interventions to prevent and alleviate a variety of foot and lower-limb conditions in older people and long-term chronic lower limb and foot conditions. Conventional understanding of the role of footwear interventions on balance performance and gait in long-term chronic conditions centres around their mechanical influence on optimising kinematics, including foot position, proximal lower-limb alignment, shock attenuation, motion control, redistribution of plantar pressures, pain relief, or a combination of these. However, recent evidence suggests that beneficial sensorimotor alterations may also be an important factor. This new insight is based on growing work exploring the effects of balance enhancing, textured and vibrating insoles on standing balance and walking. Footwear interventions that provide non-mechanical tactile stimulation, such as textured insoles, may alter the rate of discharge from mechanoreceptors or spatiotemporal firing patterns of populations of sensory afferents located in the feet of people with multiple sclerosis, stroke and Parkinson's disease. This presentation suggested that clinicians should be aware that textured insoles or any other sensorimotor insole could be used as a simple, cost-effective intervention for people with neuromuscular conditions to enhance the perception of comfort and reduce the fear of falling.