CASE REPORT

Metatarsalgia: Clinical Profile and Comfort from Foot Orthoses Treatment

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ABSTRACT

Introduction: The biomechanical factors influencing metatarsalgia etiology have been well documented; however, patient characteristics of individuals suffering from this condition and the effectiveness of foot orthosis therapy remain unknown.

Objectives: The objectives of this study were 1) to characterize the metatarsalgia profile of patients seeking treatment in a footwear and orthotic clinic, and 2) to explore the association between comfort and pain in patients with metatarsalgia who were treated with foot orthosis intervention.

Study Design: This study is a retrospective chart review.

Methods: Metatarsalgia assessment and follow-up data (case group n = 2137) were extracted from a research database (control group n = 82,822) from patients visiting a private foot care clinic. A clinical assessment was performed by a Canadian-certified pedorthist, and footwear recommendations and bilateral custom foot orthoses were provided to all patients. Feet were casted using a three-dimensional volumetric laser scanner. Orthoses (80% of cases) were manufactured from a direct mill polypropylene shell; additional rearfoot, forefoot postings, and/or metatarsal support was added according to the patient's personalized treatment plan.

Results: Eighty-one percent (81%) of metatarsalgia patients reported symptom improvement following custom orthoses treatment. The average pain reduction from the orthotic intervention was 58.55%. The average self-reported comfort scores were 7.7 ± 2.2/10 at follow-up.

Compared with our control group, patients with metatarsalgia were more frequently self-identified as females, over 51 years of age, and the condition was observed in a higher prevalence of high cavus feet.

Conclusions: Our results suggest that a pes cavus foot posture is a biomechanical risk factor to the development of metatarsalgia. Custom foot orthoses that are manufactured according to a patient's personalized treatment plan are an effective conservative treatment option for pain reduction in patients suffering from metatarsalgia.

Clinical Relevance Statement: Foot orthoses are an effective conservative treatment option for pain reduction in metatarsalgia patients. (*J Prosthet Orthot.* 2024;36:e75–e81)

KEY INDEXING TERMS: metatarsalgia, foot orthoses, pedorthists

Metatarsalgia is a common foot disorder defined by painful symptoms under the forefoot. Rather than a pathological diagnosis, this symptomatic description of forefoot pain can encompass a breadth of clinical ailments, which challenges our understanding of prevalence rates, the methods of classifying the condition, and the effectiveness of conservative treatment. Although experimental evidence has grown our understanding of the biomechanical factors influencing the conditions' etiology,[1] patient characteristics of individuals suffering from metatarsalgia and the effectiveness of foot orthosis therapy linked to specific metatarsalgia symptoms remain unknown. This gap in the literature undermines a clinician's ability to derive determinants of clinical success when developing and improving their treatment protocols specific to this condition. Furthermore, this highlights the importance of generating research protocols that link specific biomechanical risk factors and mechanism of onset to the specific features of foot orthoses design that optimize treatment success.

A symptomatic forefoot is commonly termed "metatarsalgia." Distinct from a medical diagnosis, metatarsalgia encompasses various etiologies,[2] and until recently, it was considered the "default" diagnosis when patients presented with a chief complaint of forefoot pain. More recently, metatarsalgia has been defined as "an acute or chronic pain in relation to one or more metatarsophalangeal joints caused by damage (whether or not of mechanical origin) to the anatomical structures that interact with the joint (bone, cartilage, capsule and ligaments, vessels,

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Conflict of Interest: K.A.R. and M.B.R. are both Canadian-certified pedorthists who are employed by The Kintec Group.

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nerves, tendons, bursae and the subcutaneous tissue, and skin)".[3] Importantly, this definition highlights that metatarsalgia pain is not limited to the plantar surface of the foot, and in fact, it may present itself on the dorsal, medial, lateral, and/or plantar surface of the forefoot. Nonetheless, plantar forefoot pain is one of the most common symptoms in patients visiting footwear and orthosis clinics, and a thorough understanding of metatarsalgia etiologies and classifications[2–6] can strengthen clinical decisions when determining treatment solutions (Table 1). As 90% of all metatarsalgia cases are explained by biomechanical factors,[3,6] it is important to understand the anatomical and biomechanical factors that predispose metatarsalgia. Unfortunately, the lack of published recommendations on specific assessment procedures that are linked to pedorthic interventions challenges clinicians' ability to identify the physical examination characteristics that are most relevant to predict the effectiveness of foot orthosis interventions.

The patient's presentation of a symptomatic forefoot remains the primary determinant of a metatarsalgia diagnosis. In common lower-limb conditions, such as plantar fasciitis[7] and diabetes mellitus,[8] empirically supported patient characteristics have helped sculpt patient profiles that assist in confirming the diagnosis and most appropriate treatment path for a condition. This link between a patient's symptomatic presentation and targeted treatment plan is simpler in these examples as clinicians can generate treatment solutions that are targeted toward specific tissues (plantar fasciitis) and/or disease processes (diabetes mellitus). With respect to metatarsalgia, the patient profile currently remains unknown, and as the condition is defined by diagnosis of pain, this underlying diagnosis can come from a variety of conditions. This ultimately challenges a clinician's ability to determine a definitive diagnosis from the patient's presenting symptoms, which further challenges a foot care specialist's ability to effectively determine the optimal clinical management for the condition.

The treatment of metatarsalgia symptoms is similar to many musculoskeletal conditions whereby conservative approaches focus on reducing metatarsal load and a transition to invasive procedures should only occur following the exhaustion of alternative therapies.[4,6] Metatarsal pads, a common foot orthosis modification, have proven effective at redistributing forefoot plantar pressures and subsequently reducing pain secondary to peak metatarsal load.[9–12] Increased forefoot load is also common in a more supinated foot posture,[3–5] lending evidence to the anecdotal

Table 1. Clinical presentation of the three types of metatarsalgia

Primary Metatarsalgia **Due to causes originating within the foot or related structures**	
Functional pathology	1. Functional leg length difference 2. Footwear related
Structural pathology	1. Freiberg disease 2. Sesamoid pathologies 3. Metatarsal stress fracture 4. Metatarsal or first ray instability 5. Plantarflexed first ray 6. Hallux rigidus 7. Hallux valgus 8. Equinus/pes cavus foot 9. Hindfoot pathology
Secondary Metatarsalgia Due to metatarsal loading via indirect mechanisms	
Inflammatory pathology	1. Rheumatoid arthritis 2. Osteoarthritis of metatarsal joints 3. Lupus
Metabolic/systemic	1. Gout 2. Diabetes mellitus
Infection	1. Leprosy
Neurological disorders	1. Tarsal tunnel syndrome 2. Charcot-Marie-Tooth 3. Friedreich's ataxia 4. Polio
Iatrogenic Metatarsalgia Variant of primary metatarsalgia, occurs secondary to surgery	
	1. Failed hallux valgus surgery/failed fusion 2. Failed corrective metatarsal osteotomies 3. Failed equinus correction
Other	1. Failed hallux valgus surgery/failed fusion 2. Failed corrective metatarsal osteotomies 3. Failed equinus correction

link between metatarsalgia and pes cavus feet. Furthermore, a recent systematic review has highlighted foot orthoses as the most effective conservative treatment option in reducing pain and improving function in patients with forefoot pain.[13] Despite these promising results, the review aggregated all forefoot conditions together, which limits our ability to differentiate between the effectiveness of orthosis care for metatarsalgia patients compared with other forefoot conditions. Also worth considering, certain orthosis designs may be best suited for a certain subset of patients with metatarsalgia, and when consolidating all forefoot conditions together, this limits the extrapolation of subsequent clinical questions.

Perhaps it is time to shift the foot orthoses narrative toward highlighting the importance of patients' perceived comfort in foot orthoses, rather than having a treatment goal of simply modifying biomechanical factors. It has been previously suggested that to maximize the benefits of foot orthoses treatment, the patient must perceive the device to be comfortable.[14] Above changing the sensory input filtered through the soft tissues of the plantar foot sole,[15] increased comfort is also related to increased patient compliance.[16] Consequently, the purpose of this study was to characterize the patient profile of individuals suffering from metatarsalgia seeking treatment in a footwear and orthosis clinic. Second, we aimed to explore the association between comfort and pain in a cohort of patients following the treatment of metatarsalgia with foot orthoses.

METHODS AND PROCEDURES

PATIENT ENCOUNTERS

Between January 2016 and June 2023, the research database recorded approximately 90,000 patient encounters (clinical appointments) from patients visiting a private foot care clinic (Kintec Footlabs Inc, Surrey, British Columbia, Canada) at locations across British Columbia and Ontario, Canada. These encounters include initial assessments, follow-up appointments, and email correspondences to patients. Total encounters were subdivided into non-metatarsalgia patients (which included primary diagnoses such as plantar fasciitis, knee osteoarthritis, and other varying medical conditions) and the metatarsalgia patients (comprising patients whose symptomology and clinical presentation were consistent with a clinical diagnosis of metatarsalgia). A metatarsalgia encounter was defined based on the patient's physician referral and corroborated by the pedorthic assessment findings, including the history taking, presenting condition, palpation, range of motion testing, and weight-bearing observations.

METATARSALGIA PATIENTS

Metatarsalgia assessment data are derived from individuals who were either self-referred and/or referred by a primary health care professional (example: physician) to visit 1 of 20 Kintec locations (Kintec Footlabs Inc, Surrey, British Columbia, Canada). All patients signed an informed consent statement, which acknowledges the use of deidentified clinical data in internal research activities prior to attending their appointments. A Canadian-certified pedorthist completed a comprehensive assessment that detailed the patient's medical history, primary symptoms in and around the forefoot region, specific location of pain and description of symptoms, activities of daily living, and routine footwear selection and usage. Patients were asked to score their current level of pain on a scale of 1 (no pain) to 10 (worst pain imaginable). Static postural observations detailed the patient's structural alignment and joint position of the shoulders, hips, knees, and ankles, from the frontal, sagittal, and posterior views. The Foot Posture Index[17] characterized the patient's static foot posture on a spectrum ranging from highly cavus (high arch) to highly planus (low arch) feet. A biomechanical gait analysis was conducted via video recordings of patients walking (Coach's Eye, TechSmith Corp on Apple iPad, gen. 7–9) with and without footwear and characterized the patient's initial contact, midstance, and toe-off kinematics in a hallway or on a treadmill. Lastly, non–weight-bearing range of motion of the first ray, hallux, midtarsal, and subtalar joints were evaluated, accompanied by single and double heel raises. At the conclusion of each assessment, the pedorthist classified the patients' condition as metatarsalgia from the following findings: pain with and without palpation, on and around the plantar and/or dorsal surface of the lesser metatarsal heads. Furthermore, the pedorthist confirmed the absence of the following: a positive Mulder's sign and pain with palpation along the metatarsal shafts screening for possible stress fracture and/or pathologies of the osseous structures. If patient symptomology was secondary to a Morton's neuroma, a metatarsal stress fracture or osseous pathology, neurological origin, and/or arterial or vascular disease, the patient was also excluded from the metatarsalgia patient group.

PERSONALIZED TREATMENT

Following the physical examination, the pedorthist developed and communicated a personalized treatment plan to each patient. It is standard protocol for the pedorthist to discuss footwear recommendations based on each patient's current footwear selection, daily activities, and occupational requirements. The patient's feet were scanned using a three-dimensional volumetric laser (Occipital, Stockholm, Sweden), and bilateral custom orthoses intended to reduce pressure from this region of the foot sole were manufactured. In greater than 80% of the patient cases, the orthosis shell was manufactured from direct mill polypropylene (shell support: 64% semirigid, 34% semiflex, 1% flexible, 1% rigid). Cast processing software (Orthomodel, AutoDesk, San Francisco, CA, USA, and FitFoot360, Bromsgrove, United Kingdom) applied any additional rearfoot and/or forefoot posting(s) and top cover to the device. Supplemental metatarsal support through the form of either a metatarsal or neuroma pad was provided based on pedorthist's discretion (metatarsal correction height: 56% low, 40% medium, 4% high).

Patients returned to their respective clinical location approximately 2 weeks post-assessment for their custom orthoses fitting appointment. The custom orthoses were fit to patients' footwear by replacing the prefabricated sock liner with each orthosis or overlaying the orthosis over the footwear's insole (common for lower-profile orthosis designs). Patients were instructed to gradually "break in" their custom orthoses by increasing wear by 1 hour per day. If comfort was not achieved 3 weeks post-orthoses dispensing, patients were instructed to contact their pedorthist to arrange for an adjustment consultation. If an adjustment was not scheduled, the clinician would communicate with the patient via telephone and/or email to inquire on pain status (scored on the same scale as recorded at assessment), 1 (no pain) to 10 (worst pain imaginable), physical function, and daily hours of wear in the orthoses.

STATISTICAL ANALYSIS

All data were assessed for normality using the Kolmogorov-Smirnov test. Statistical differences in gender between the non-metatarsalgia and metatarsalgia groups were compared with a Pearson's chi-square test, age was compared with an independent *t*-test, and FPI score was assessed with the Mann-Whitney nonparametric test as FPI data violated the assumption of normality (SAS University Edition, 2.8.1, version 9.4). Variances in age between the metatarsalgia and non-metatarsalgia patient groups were unequal, and statistical results were corrected with the Satterthwaite method. Spearman's rho was used to evaluate the association between perceived comfort in foot orthoses and change in pain scores. Data met the assumptions for the Spearman's rho, and the equality of variances was assessed with the Folded F test.

To evaluate the association between patient comfort in orthoses and pain reduction at follow-up, a correlation was run (SAS University Edition, 2.8.1, version 9.4) between the metatarsalgia patient's global rating of change scores (pain at assessment minus pain at follow-up) and self-perceived comfort in their foot orthoses. The statistical results were evaluated according to commonly reported correlational values: 0.70 to 1.00 (−0.70 to −1.00) = strong positive (negative) correlation, 0.30 to 0.70 (−0.30 to −0.70) = moderate positive (negative) correlation, and 0.00 to 0.30 (0.00 to −0.30) = weak positive (negative) correlation. The statistical significance was set at an alpha of $P = 0.05$.

RESULTS

All patient records included in the pedorthic database (90,000+ records) were divided into non-metatarsalgia (n = 82,822) and metatarsalgia (n = 5857) patient groups. A subset of both non-metatarsalgia (n = 23,449) and metatarsalgia (n = 2137) encounters was extracted from each patient group, which represented patient cases that included complete assessment and accompanying follow-up data (Figure 1).

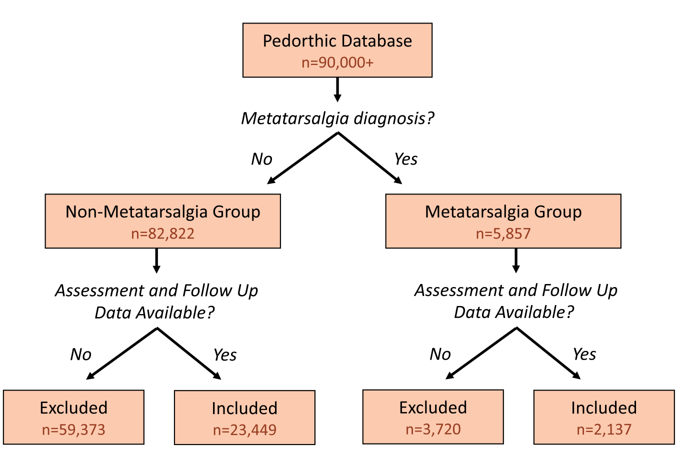

Figure 1. A graphical representation of the chart review process in excluding/including patients in the non-metatarsalgia and metatarsalgia patient groups.

THE PATIENT PROFILE

There was a significant association between metatarsalgia groups and gender, χ^2 (1) = 25.76, $P < 0.0001$. More specifically, the metatarsalgia patients were composed of 60% females (n = 853) and 40% males (n = 573) (Figure 2A), representing 7% more females with metatarsalgia compared with the gender distribution across non-metatarsalgia conditions. The independent *t*-test results revealed a statistically significant ($t_{789.4} = -18.62$, $P < 0.0001$) difference in age between the non-metatarsalgia (45.14 ± 18.34 years) and metatarsalgia (55.58 ± 14.53 years) patients. Metatarsalgia patients were, on average, 10 years older than the non-metatarsalgia patients. Sixty-eight percent (68%) of metatarsalgia patients were over the age of 51 years (Figure 2B), a 24% increase compared with non-metatarsalgia cases. Above the age of 51 years, the metatarsalgia gender distribution remained 60% females and 40% males.

Foot Posture Index scores significantly differed between the metatarsalgia patients (Mdn = 267.93) compared with the non-metatarsalgia patients (Mdn = 993.89) ($W_s = 74215.50$, $z = -21.93$, $P < 0.0001$). Patients in the metatarsalgia group had significantly higher FPI scores (11% of patients had supinated foot posture) compared with patients in the non-metatarsalgia group (8%) (Figure 2C). Additionally, the pedorthists' static assessments identified Foot Posture Index scores of 51% of patients with metatarsalgia having normal (FPI score between 0 and +5) (Figure 2C and Figure 3) foot postures, a 19% increase compared with non-metatarsalgia patients. All comparative data between the metatarsalgia cases and non-metatarsalgia cases are included in Table 2.

At follow-up, 52% of metatarsalgia patients were wearing the orthoses greater than 6 hrs/day, 20% of patients were wearing them 4–6 hrs/day, 17% 1–3 hrs/day, and the remainder 10% reported wear a few times/week.

THE ASSOCIATION BETWEEN COMFORT AND PAIN

At initial assessment, the average pain score of metatarsalgia patients was 6.27 ± 2.3. At follow-up (mean duration = 30 days), 81% of metatarsalgia patients reported symptom improvement following custom orthoses treatment. Fifty-three percent (53%) of patients were wearing their foot orthoses 6+ hours a day, and the average pain reduction from the orthosis intervention was 58.55%. On a comfort scale of "0" (unable to tolerate orthosis) to "10" (extremely comfortable), the average self-reported comfort level of the foot orthoses was 7.7 ± 2.2 at follow-up. The results of our correlational analysis revealed a significantly low positive relationship between pain improvement and comfort in orthoses, $r(1538) = 0.28$, $P < 0.0001$.

DISCUSSION

The overall aim of this retrospective analysis was to characterize the patient profile of individuals suffering from metatarsalgia and to explore the association between comfort and pain following foot orthoses treatment. The results of our study describe the foot posture variance of individuals presenting with metatarsalgia and highlight the effectiveness of foot orthoses as conservative treatment.

LINKING THE CLINICAL PICTURE WITH BIOMECHANICAL RISK FACTORS

The results of our retrospective chart review have confirmed a gender bias toward females and individuals over the age of 51 years of age visiting orthosis clinics for metatarsalgia treatment. Structural pathologies known to influence metatarsalgia etiology, such as hallux valgus, have a higher prevalence in women[18] and may lend support to the observed gender differential in our patient profile. Furthermore, functional pathologies that can exacerbate metatarsalgia symptoms include inappropriately fitting footwear and/or heeled shoes that raise the heel pitch and increase forefoot pressures during weight-bearing. Not surprisingly, prolonged wear of high-heeled shoes, which are more frequently worn by women compared with men, is associated with higher levels of forefoot pain.[19] Also worth noting, this condition is observed across all foot postures, although a higher prevalence of cavus feet has been observed in metatarsalgia patients compared with non-metatarsalgia patients. Load and pressure to the metatarsal heads, due to insufficient length of the metatarsal bones and/or their position relative to the walking environment, have been reported as common biomechanical factors increasing the susceptibility of metatarsal head overloading,[6] a fundamental etiological cause of metatarsalgia. Our foot posture results are consistent with this etiology and support the interpretation of pes cavus foot posture as a biomechanical risk factor to metatarsalgia.[3–6]

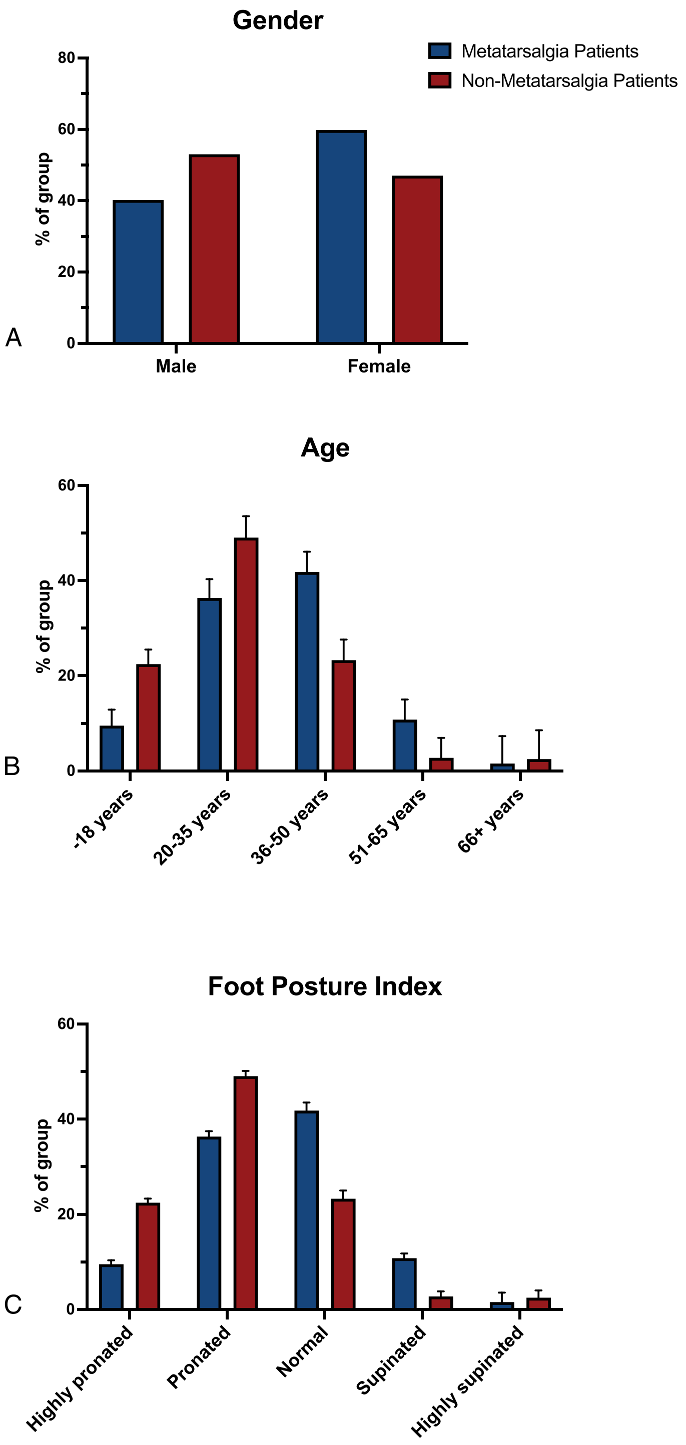

Figure 2. The comparison of gender (A), age (B), and Foot Posture Index (FPI) scores (C) between metatarsalgia patients and nonmetatarsalgia patients.

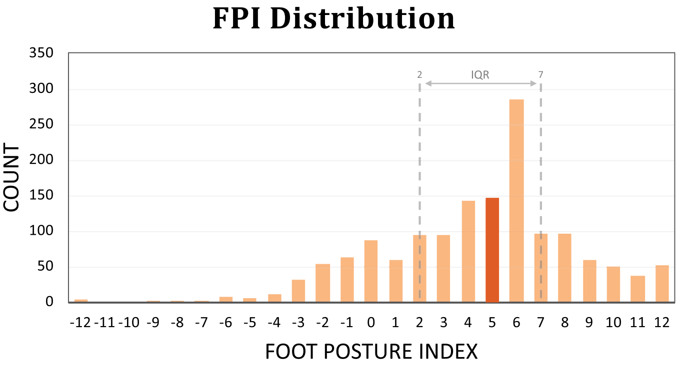

Figure 3. The Foot Posture Index (FPI) distribution of metatarsalgia patients included in the case group. FPI scores are associated with the following division of foot posture variance: 0 to +5 = normal foot posture; +6 to +9 = pronated; > + 10 = highly pronated; −1 to −4 = supinated; −5 to −12 = highly supinated. The dashed vertical lines represent the first and third quartiles of the interquartile range. The median FPI score of 5 has been highlighted with a darker orange bar.

The high medial longitudinal arch angle of pes cavus feet minimizes the surface area contact between the foot sole and walking environment.[20] This load distribution exacerbates localized pressure under the forefoot region,[21] thus increasing susceptibility of overuse injury and increased risk of forefoot pathologies in this foot posture. During dynamic load, peak pressure under the forefoot is significantly greater in cavus feet compared with normal.[21] This is further exaggerated during the propulsion phase of gait when center of pressure velocity is reduced[22] as a compensatory mechanism to generate sufficient angular momentum for the efficient forward progression required during walking. This can be especially problematic considering the reduced load distribution under the midfoot region earlier in stance. Thus, our fundamental goal of foot orthosis treatment to reduce pressure from this region of the foot sole[23] is warranted. Despite not measuring plantar pressure data in our patient assessments, patients' feet were scanned with

Table 2. The clinical profile of nonmetatarsalgia patients versus metatarsalgia patients

Patient Demographics	Non-metatarsalgia Patients n = 82,822	Metatarsalgia Patients n = 5857
Age (years)	44.69 ± 18.85	53.85 ± 15.39
Height (cm)	168.93 ± 13.22	169.25 ± 11.45
Weight (kg)	76.37 ± 20.65	75.75 ± 17.88
Gender (% cases)		
Females	53	60
Males	47	40
FPI, right (left) (% cases)		
Severely pronated	11 (13)	6 (7)
Pronated	36 (36)	29 (34)
Neutral	43 (42)	51 (44)
Supinated	8 (7)	11 (12)
Severely supinated	2 (3)	2 (3)
Pain (at assessment)		
Worst pain*	6.26 ± 2.23	6.27 ± 2.30
Physical function (% cases)		
Mild	59	61
Moderate	31	32
Severe	8	5
Extreme	2	2
Pain (at follow-up)		
Physical function (% cases)		
Mild	54	55
Moderate	37	36
Severe	8	7
Extreme	1	2
Rating of improvement (% cases)		
Completely recovered	8	8
Improved	73	51
No change	16	18
Worse	3	23

*Worst pain, scores on 0 (no pain) to 10 (worst pain) scale.

intent to maximize full foot contact between the foot sole and orthosis, and the contoured fit was confirmed at follow-up.

Anatomical and/or biomechanical factors that predispose the metatarsal position closer to the coronal plane environment will exacerbate the loading forces across the metatarsal bones. In normal human locomotion, eccentric contraction of posterior compartment musculature lifts the heel off the ground and increases the force between the metatarsal heads and the walking environment. Thus, normative gait suggests that the forefoot is loaded after the completion of midstance. These biomechanical factors, coupled with the forefoot's inclination angle of cavus feet that drives metatarsals into the walking surface, are commonly accompanied with first ray hypermobility.[1] This metatarsal flexibility, reported up to 5-mm greater in metatarsalgia patients versus non-metatarsalgia patients,[1] was evident in our patient cohort and confirms another biomechanical risk factor to metatarsalgia that was evident in our clinical practice profile. Future research is encouraged to study this pathology and correlate clinical risk factors with plantar pressure distribution and kinetic outcome measures during gait.

THE EFFECTIVENESS OF FOOT ORTHOSES TREATMENT

Our retrospective chart review suggests that foot orthoses are an effective conservative treatment option for pain reduction in metatarsalgia patients. Greater than 50% of the patients' dispensed custom orthoses were being worn the entire day with near 60% pain reduction. Furthermore, the results of our correlation confirm that orthosis comfort is directly related to a patient's pain reduction. This linear relationship suggests that as patients were more comfortable in their foot orthoses, they were also reporting greater improvements in their metatarsalgia pain.

It is noteworthy for clinicians to appreciate the connection between how comfortable an orthosis is to a patient's self-reported pain relief. Considering the recent push to understand the mechanism by which foot orthoses function, these results provide compelling evidence to support the link between a patient's sensory response and the effectiveness of foot orthoses. Perceived effectiveness from a device that is inserted under the foot sole is likely modulating neurological, muscular, and plantar pressure distribution profiles and encouraging a paradigmatic shift from subtalar joint neutral theories toward neuromotor approaches.[15] Furthermore, as surgical success for metatarsalgia remains controversial,[5] these results highlight the value of orthoses as a conservative treatment option and the importance of ensuring patient comfort when wearing their devices.

Our narrative surrounding foot orthoses and metatarsalgia would not be complete without addressing the value of certain structural elements in orthosis design. The contribution of a custom-contoured device and its ability to distribute pressure along the medial longitudinal arch has proven to be more effective at reducing forefoot plantar pressures compared with non-custom insoles.[24] Furthermore, 94% of our metatarsalgia patients were dispensed orthoses with some type of metatarsal support (pad or bar). Consistent with previous research using metatarsal support for the treatment of this condition,[25] the accurate positioning of metatarsal pads can effectively reduce forefoot plantar pressures. Although forefoot load was not measured in our patient cohort, the combination of metatarsal support and a custom-contoured arch is assumed to reduce the abnormal biomechanical movements throughout stance, increase surface contact along the medial longitudinal arch, and subsequently minimize excess loading force between the metatarsals and walking environment.

Our retrospective chart review has a few limitations worth noting. First, the lack of standardization in clinicians' testing procedures reduces our ability to quantitatively characterize joint range of motion (ROM) in patients before and after orthosis treatment. Although pedorthists document patient ROM in comparison to normative ROM of major joints of the lower limbs, qualitative descriptors such as "limited," "normal," or "hypermobile" allow for stronger systematic standardization between pedorthists spanning clinics across two provinces. Second, the small percentage of patients in our metatarsalgia group who did not have metatarsal support in their foot orthosis treatment reduces our ability to compare results to those receiving this metatarsal support.

In conclusion, the patient profile of individuals suffering from metatarsalgia seeking treatment in a footwear and orthosis clinic has been defined. Furthermore, foot orthoses manufactured by a Canadian-certified pedorthist have been demonstrated to be an effective conservative treatment option for pain reduction in metatarsalgia patients. Future research is encouraged to quantify clinical outcomes with kinetic and plantar pressure measurements and continue detailing the orthosis manufacturing details in the provision of custom-made foot orthoses across experimental protocols. As clinicians and scientists, we encourage this important next step in bridging the connection between industry and academic research.

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