

# Chronic Ankle Instability - A Review

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## ABSTRACT

Chronic ankle instability (CAI) characterized by repetitive bouts of giving way with pain, swelling, weakness, or reduced ankle range of motion, diminished self-reported function and recurrent ankle sprains persisting more than 1 year after the initial injury. Chronic ankle instability is a wide continuum encompassing both mechanical and functional ankle instability. The manifestations of CAI are impaired postural control, proprioceptive and balance deficits, impaired performance of activities of daily living and reduced quality of life. A holistic rehabilitation approach including mobility exercises, strengthening, neuromuscular and proprioceptive training and cognitive behavioural therapy should be incorporated in chronic ankle instability patients

**Keywords:** chronic ankle instability, balance, postural control, rehabilitation.

## INTRODUCTION

Ankle sprain is a common musculoskeletal condition, seen in sporting population as well as in general community. [1] Injury to the lateral ankle ligaments by forced inversion of the ankle joint is one of the most common injuries. Mostly, only the anterior talo-fibular ligament (ATFL) is affected but rarely a combine injury with a rupture of the calcaneo-fibular ligament (CFL) occurs. [2] Acute symptoms resolve faster however pain and instability remain as persistent problems. [1] In most of the cases, complete functional recovery occurs by conservative management. However, upto 20% of individuals face issues such as lateral ankle instability and recurrent ankle sprains. [2] Peters et al reported 10% to 30%

recurrent symptoms and reinjury post lateral ankle sprain. [3] The recurrence rate for lateral ankle sprain among athletes has been reported to be as high as 80%. [4] Research also says that approximately 47–73% of cases with ankle sprain will suffer from recurrent sprains. [5] If this continues for more than 6 months, it is termed as chronic ankle instability. [2]

## CHRONIC ANKLE INSTABILITY

Chronic ankle instability (CAI) is a condition characterized by repetitive bouts of giving way with symptoms such as pain, swelling, weakness, reduced ankle range of motion and diminished self-reported function. [6] Chronic ankle instability can lead to proprioceptive deficits and increased ligamentous laxity. Walking, jumping, occupational involvement, and sporting activities can be affected. [7]

Chronic ankle instability is a wide continuum encompassing both mechanical and functional ankle instability. [8] Mechanical instability results from increased joint laxity, and is usually related to damage of the ligamentous structure of the ankle. [9] Functional ankle instability is a very common sequela of ankle sprain, affecting approximately 32% to 47% of patients with symptoms including sensations of giving way, subsequent sprains, and instability. [10] It leads to debilitating health and economic consequences such as reduced quality of life, time lost from work and the development of early-onset osteoarthritis are taken into consideration. [11]

## CAUSES

A significant predisposing factor for the development of CAI is the history of at least one previous lateral ankle sprain. The risk of developing CAI is as great after a severe ankle sprain as after one or more minor sprains. Thus, there are many other factors leading to the development of CAI. [12] Lower limb varus mal-alignment has been described as one of the important factor predisposing to ankle sprain and CAI. Alteration in tibiotalar joint axis, talar dome radius or change in position of the lateral malleolus can predispose to ankle sprain and CAI. [12] Subtalar joint anatomical variations or pathologies act as risk factors of CAI. Changes in the lateral collateral ligaments of ankle joint is a risk factor for development of CAI. Any pathology of peroneal tendons is an intrinsic risk factor for CAI. [12] An altered peroneal reaction time is also one of the leading cause of CAI. [11]

## COMMON IMPAIRMENTS

The functional impairments observed in chronic ankle instability are postural control deficit, impaired balance, altered proprioception, reduced muscular strength, increased reaction time and altered range of motion. [13] In patients with CAI, recurrent ankle sprains result in secondary tissue injuries such as lesions of the muscle tendon, bone, cartilage and synovial membrane of the ankle joint. Along with this, increased laxity is present in the ligaments which are mainly ATFL and CFL. Further, a decreased anterior posterior glide of the talus on tibia results in decreased dorsiflexion ROM. [14,15] Proprioceptive deficits have been reported as difference in active and passive joint position sense leading to increased risk of recurrent ankle sprain. [14, 15] Long term psychological and physical stress caused by persistent or chronic pain leads to decreased functional participation and performance. [16] In chronic ankle instability, recurrent sprains lead to fear of movement and reduced functional performance. [14] Alteration in

static and dynamic balance is reported in CAI. [14, 17]

## OUTCOME MEASURES

The Cumberland Ankle Instability Tool (CAIT) and Identification of Functional Ankle Instability (IdFAI) questionnaire have both been used in screening CAI. [14, 18, 19] Static balance can be assessed using Single leg stance test and dynamic balance using Star excursion balance test or Y balance test. [17] The Foot and Ankle Disability Index (FADI) and Foot and Ankle Ability Measure (FAAM) have been found to be the apt tools with good reliability and validity for quantifying functional limitations in patients with CAI. [20]

Functional performance can be measured objectively using functional performance tests such as side hop test, multiple hop test, figure of 8 test etc. [21] For kinesiophobia, Tampa scale of kinesiophobia or fear avoidance belief questionnaire can be used. [14] Other investigators have used patient reported outcomes to measure health-related quality of life via generic and dimension-specific instruments. [20]

## PHYSIOTHERAPY MANAGEMENT

A systematic review revealed that incorporation of balance training interventions along with comprehensive rehabilitation programs help to improve postural control in patients with ankle instability. [21] Another study demonstrated that eight weeks of ankle disc balance training for 10 minutes per day, five days per week improved postural control in patients with functional ankle instability. [22] Another four-week balance training program comprising of single-leg foam balance, wobble board exercises, and resistance band kicks lead to improvement in balance in patients with functional ankle instability following a four-week intervention. [23]

Another study showed that comprehensive rehabilitation program

including range of motion, strengthening, and neuromuscular training exercises improved self-reported function and dynamic balance post four-week intervention in patients with CAI. [31] A randomized controlled trial analyzed the effects of four weeks of supervised balance training has been found effective for improving postural control in CAI patients. [15] A case study showed that six-week progressive neuromuscular training program including strengthening exercises, postural stability, plyometrics, and speed/agility drills in a single patient with CAI report improved self-reported function and dynamic balance. [24] Freeman et al reported improvement in proprioception following tilt board and wobble board training. [25]

Also, core strength is considered to play an important role in ankle joint stability as trunk muscle activity takes place before the lower extremity activity which stiffens the spine to form a base for functional movements. [26] There is no universally accepted protocol for core stability. Pelvic positioning, rib cage positioning, and proper patterns of neuromuscular recruitment should be addressed by a core stabilization program. [27] One of the studies demonstrated core protocol as beginning with abdominal bracing progressing to bracing with heel slides, leg lifts, bridging, standing, walking and other functional activities. [28]

Another study suggested a 4-week intervention program comprising of 12 sessions under supervision along with a 15-minute home program consisting of ankle stretching and strengthening exercises. Supervised Program consisted of Maitland grade III anterior to- posterior talocrural joint mobilizations, balance training program and proprioceptive neuromuscular facilitation technique. Dorsiflexion ROM, ankle strength, hip strength, dynamic postural control, ankle-specific function, global wellbeing, and fear-avoidance beliefs improved significantly post 4 weeks intervention and were maintained even after 2 weeks seen during follow up. [29]

Another study compared 6 week intervention for 3 different groups - balance training protocol including hop to stabilization, hop to stabilization and reach, hop-to-stabilization box drill, progressive single-limb-stance activities with eyes open, and progressive single-limb-stance activities with eyes closed; strength training protocol consisted of resistance band protocol for strengthening of dorsiflexors, invertors and evertors, single legged heel raises for plantar flexors and slow reversal proprioceptive neuromuscular facilitation technique in diagonal pattern for applying manual resistance; control group had 20 mins bicycle workout with mild to moderate resistance as their protocol. The groups - balance training protocol and strength training protocol showed improvement in strength, balance and functional performance. There was lack of movement in the control group hence no improvement in any of the outcome measures was seen. [30]

A single blinded randomized controlled trial was conducted in adolescent baseball players with chronic ankle instability. A 4-week intervention program was given. The intervention group received high velocity low amplitude intervention along with resistance exercises, while the control group received resistance exercise alone. It was observed that the pain intensity, ROM, and balance improved in the intervention group as compared to control group. [31] A systematic review which studied the changes in dorsiflexion range and dynamic postural control after mobilization in CAI individuals included 10 studies which used Mulligan Movement with Mobilization (MWM), Maitland mobilization, traction, high velocity etc. as an intervention. The study concluded that Mulligan MWM and Maitland was the moderately effective for improving dorsiflexion range and dynamic postural control however standard treatment guidelines are still required. [32]

A recent study incorporated plyometric training along with ankle

stability exercises for a duration of 8 weeks with 2 sessions each week and each session of about 40 mins. Plyometric training included hopping on different sides, jumping with or without a box, and performing single-leg and double-leg jumping (3 sets of 8 repetitions) and ankle stability exercises included active ankle ROM exercises using elastic bands and balance pads (3 sets of 15 repetitions). The study concluded that additional plyometric training helped in improving shock absorption and stability, improved dynamic balance and decreased postural sway.<sup>[33]</sup>

## CONCLUSION

Chronic ankle instability, a musculoskeletal condition, should be evaluated and managed using rehabilitative measures and preventive strategies to reduce the rate of recurrence.

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