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Effectiveness of 'Hallux Valgus' Correction to Improve Triple Jump and Long Jump Performance of a Female Athlete: A Case Report

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ABSTRACT:
Objective: This case report describes the effectiveness of Hallux Valgus (HV) deformity correction combines with other physiotherapy interventions to enhance sports performance of a female athlete.

Methods: A standard physiotherapy rehabilitation was offered to the patient visited outpatient physiotherapy service unit with the aim of reducing pain, decreasing musculoskeletal complaints, and improving sports performance. 12-week rehabilitation programme entailed stretching, strengthening, soft tissue mobilization, balance training and correction of HV deformity. Initially, pain relief by ultrasound therapy, reduce muscle spasm and tightness by soft tissue mobilization were achieved. Once the pain has improved, correction of HV, strengthening and balance training were initiated.

Clinical Findings: Pain has improved from VAS 7 to VAS 1 and right calf muscles tenderness was relieved totally within three weeks. First metatarsophalangeal angle in right foot was improved. Corrective taping for HV during training and competitive events was effective for better performance without discomfort. There was a significant improvement in triple jump and long jump performance after the rehabilitation.

Conclusion: This case study will be an inspiration and preliminary study for further researches to investigate the effectiveness of HV correction in combination with other physiotherapeutic interventions on improving sport performance in athletes engaged in jumping events.

Keywords – female athlete, hallux valgus, jumping events, physiotherapy rehabilitation, sports performance triple jump

I. INTRODUCTION

Best performance at the highest possible competitive level is the utmost aspiration of every athlete which remarks a distinctive hallmark of their sports carrier. Hallux valgus (HV) is one of the major deformity that is associated with lower extremity biomechanical changes of jumpers thereby negatively affect the performance. HV is a progressive foot deformity which accompanied by pain and substantial functional limitations together with medial displacement of first metatarsal and lateral displacement of proximal phalanx. Muscle imbalances, inherited structural alterations, flatfoot and poorly fitting footwear are the main etiological factors of HV [1]. Surgery could be considered when conservative management does not alleviate symptoms [2]. Prevalence of Hallux valgus has been estimated as 23% in adults aged 18-65 years and its prevalence is more in males and with increasing in age [3].

This case report presents how the interventions to correct HV deformity in a female athlete significantly enhance the performance of her sports events.

II. CASE PRESENTATION

A 24 year-old an elite level female athlete who practices in two track and field events; Triple Jump and Long Jump was referred to physiotherapy outpatient department due to pain in medial aspect of right lower limb, which has perceived for two days. Pain was presented throughout walking and climbing stairs, and it was aggravated by sports activities. Furthermore the patient's history revealed no trauma to right lower limb.
Physical assessment revealed limping gait, tenderness over antero-medial aspect of right knee, tightness of right

calf muscles and Achilles tendon, limited range of motion (ROM) at right knee and ankle joints. All the special tests conducted to find out the knee condition were negative.

Furthermore, HV deformity was noticed in both feet where the right side deformity was more pronounced than the left.Severity of the deformity was assessed using four-point Manchester scale [4]. Physical examination on right side HV deformity revealed tenderness of hallux, weakness of hallux abductor muscle and flexor halluces brevis muscle. Patient was examined in both sitting and standing positions for the deformity, which was significantly prominent during standing.

Physiotherapy management was started with ultrasound treatment which offered over a two weeks period with a frequency of twice a week over tender areas. Soon after the pain subsided, a rehabilitation program was implemented to improve strength of abductor hallucis longus and flexor hallusis muscles [5], stretching of Achilles tendon, soft tissue mobilization on calf muscle group were gradually in cooperated.

To address the correction of genu valgus deformity, patient was advised to wear proper, well-fitting sports shoes with medial arch support, which relieve more pressure on medial aspect of foot during the sports activities. Strengthening of great toe muscles and foot muscles was initiated and patient was instructed to engage in toe-spread-out exercise at home. Balance training program [6] was also in cooperated at the latter part of the rehabilitation program. Patient was advised to engage in relevant sports activities within pain limit and avoid pain aggravating activities. Taping was done to correct the HV deformity in the corrected which was resulted in reducing pain during take-off and landing phases.

Patient evaluation was carried out at the baseline, at the end of 06 weeks and at the end of 12 weeks. Patient was subjected to VAS and four-point Manchester scale to assess pain and the degree of HV deformity respectively. Patient's performance at interuniversity and national level jumping events was recorded to evaluate the improvement of her sports performance after the rehabilitation program.

At the end of two weeks, pain was significantly improved from '07 points' to '01 point'. HV deformity was improved from 'Grade 3' (Moderate deformity) to Grade 2 (Mild deformity) at the end of 12 weeks of rehabilitation program. The hallux angle of right foot was reduced from 30 ˚ to 19 ˚ after 12 week of rehabilitation program. Performance evaluation revealed that her triple jump performance was improved from 9.93m to 10.13m, and her long jump performance was improved from 4.74m to 4.8m after undergoing the rehabilitation program. Accordingly, patient's performance at triple jump and long jump events was improved by 0.1m and 0.06m respectively.

Physiotherapy rehabilitation program was comprised total of 14 sessions, during initial two weeks there was two sessions per week whilst patient had to follow single session per week over subsequent 08 weeks.

III. DISCUSSION

The maximum possible jump achieved by the athlete is determined by the physical and technical qualities of the jumper [7]. Therefore, the presence of HV deformity in an elite athlete has a negative impact on the sports performance due to changes of kinetics and kinematics of the lower limb. Patients with hallux valgus were found to have laterally shifted Center of Pressure associated with reduced toe-out angle of the foot due to increased internal rotation of hip. Medial load on the knee gets altered due to the kinetic and kinematic changes of the other joints of corresponding lower limb. It was also found that, early intervention for hallux valgus help for both pain reduction and slow down the progression of deformities, as well as, to prevent harmful loading at medial knee [8] Taping was also found to be useful in reducing HV angle [9].

IV. CONCLUSION

This case report highlights the importance of the correction of hallux valgus on enhancing triple jump and long jump performance in a female athlete. In particular, appropriate physiotherapy rehabilitation focusing not merely on muscle spasm, muscle strengthening and balance training but also correction of minor deformities has a greater impact on the performance of the athletes.

It is evident that, early physiotherapy interventions should be implemented to correct the kinetics and kinematics of the lower limb combined with the other interventions, with the aim of allowing the athlete to reach their utmost level and endeavor their best performance.

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