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Abstract

Ankle sprains are common injuries in variety sports. It's happened 54-66.9% occur in badminton players. This study design used review articles study. A literature search was conducted systematically using ACSM, AJSM, BJSM, OJSM and human sport and exercise databases to retrieve articles published until December 2013. Controlled trials and controlled laboratory studies comparing different strategies to promote early recovery of ankle sprain were included. There are limited studied in balance training program and ankle sprain. Five control and treatment study were reviewed. The study reported that balance training program significantly to reduce ankle sprains. The Balance training program can be applied to reduce risk ankle sprains in badminton players.

INTRODUCTION

Ankle sprains are the most common injuries in variety of sport likes football, soccer, basketball, volleyball, tennis, badminton, running and others (Gioftsidou et al., 2012; Cumps et al., 2007; Hoy et al., 1994). Ankles injuries in badminton players ankle 54%-66,9% caused by non-contact injuries (Hoy et al., 1994; Kroner et al., 1990). The incidence has been reported injury risk was 57% in badminton and injury rate was 0.9 injuries per player per 1000 training hours (Goh et al., 2013). In addition the ankle sprains has reported to be between 2 and 7 per 1000 person years (Bridgman et al., 2003; Holmer et al., 1994; Waterman et al., 2010). The lost of training times, the value of process ankle sprains can be expensive for each players and health care system (Hupperets et al., 2010; Verhagen et al., 2005).

Recently, the treatment type exercise or control and ankle sprain history showed that exercise program in balance using elastic tubing as a perturbation force for individual improve in subject with and without a history of ankle sprain following four weeks of elastic resistance exercise (Han et al., 2009). The objective of this review was to explore the current literature on the effectiveness of balance training program treatment for ankle sprain in badminton players.

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METHOD

3 Data Sources

Studies were searched electronically using the following databases: Orthopaedic Journal of Sport Medicine, Journal of Orthopaedic & Sport Physical Therapy, The American Journal of Sport Medicine, Journal of Human Sport & Exercise, Journal of Sport Science and Medicine, Journal of Athletic Training and British Journal of Sport Medicine. The reference list of review articles, included studies and original article based on research.

RESULT AND DISCUSSION

Ankle Sprain Injuries

Ankle sprain occurs in percentage patient when they were sporting activities 54.6%, walking 28.1%, fall 14.1%, and road traffic accidents 3.1%. The median time from injury to MRI was 6 weeks (range 4 days to 12 weeks) and injuries location in the right ankle or laterality of ankle (lateral malleolus) 51.5% with average ages patient is 25 years old (Khor & Tan, 2013). Acute lateral ankle sprain use the clinical diagnose in level of function, ligamentous laxity, hemorrhaging, point tenderness, total ankle motion, swelling and pain (Martin et al., 2013; Saluta & Nunley, 2010).

Table 1. Search Research Strategy

Years: 1990- 2013	Result
Badminton injuries	3
Ankle sprain in sports	6
Balance training	3
Balance training and ankle sprain	6
Rehabilitation ankle sprain	5
Epidemiology ankle sprain 3	3
Total	26

Rehabilitation for Ankle Sprain Injuries

The important for rehabilitation program there for reduced swelling, pain sensation, and initial inflammatory response doesn't develop from overly aggressive rehabilitation and the guidelines recommended for early functional rehabilitation individualized with component of; 1) Range of motion for passive range of motion, achilles tendon, stretch, non weight bearing, achilles tendon stretch, weight bearing, alphabet exercises; 2) Strength training (isometric) with in plantar flexion, dorsiflexion, inversion, eversion, 3) strength training (isotonic) for plantar flexion, dorsiflexion, inversion, eversion, toe curls and marble pick-ups, toe raises, heel walks, toe walks (Mattacola & Dwyer, 2002). The bracing superior to neuromuscular training for the prevention of self-reported recurrent ankle sprains reported no significant difference between the brace group and the training group were found for times losses or costs due to ankle sprains (Janssen et al., 2014).

Ankle sprain prevention and rehabilitation programs have proven effective at reduce the incidence of ankle sprain in physically active individuals and improving ankle function (Hale et al., 2007; Saluta & Nunley, 2010).

Table 2. The Initial Search Identified the Effect Balance Training Programs to Ankle Sprain in Clinical Study

Studies	Study design/target population	Treatment	Type of injury/location	Outcome measures	Results
Han et al., 2009	Pilot control- exercise or control n=40, 20 males and 20 females	incorporates 2 treatment types and ankle sprain history with repeated measures. Independent variables= exercise & control dependent variables = standing balance as measure by the total travel distance (TTD) of the center of pressure (CoP) using a force platform Elastic resistance training	ankle sprain	time treatment 4 weeks the interaction between time and treatment, and ankle sprain history no significant	there is no interaction between gender, ankle sprain history, or training groups. Balance significantly improved in subject with and without a history of ankle sprain following 4 weeks of elastic resistance training
McGuine & Keene, 2006	Control-clinical trial population = 523 girls, 242 boys intervention group = 27 teams, 373 subject control group = 28 teams, 392 subject	balance training program	ankle sprain in the high school	the intervention group performed a 5-phase balance training program.	the rate of ankle sprains was significantly lower for subject in the intervention group 6.1%, 1.13 of 1000 exposures vs 9.9%, 1.87 of exposures P=0.4
Cumps et al., 2007	Pilot trial. control clinical trial Pre intervention N = 54 subject, six teams Post Intervention N = 51 subject (6 teams)	balance training program - balance field test - postural way - time to stabilization - ankle kinematics - peroneal reaction time during sudden intervention	ankle sprain in basketball	22 weeks and performed 3 times a week for 5 to 10 minutes	a significantly incidence ankle sprain lower in intervention group than control group
Gioftsidaou et al., 2012	control trial N = 38 soccer players (3 groups)	balance training program a) hemi cylindrical board b) hemi spherical board training 1) drill heading 2) drill leg passing 3) drill heading and leg passing alternate 4) control and leg passing	ankle sprain in soccer	the players maintain of unstable platform on the horizontal position	both balance training program improving balance ability for lower limb
Verhagen et al., 2004	control trial N = 116 male and female	balance board training program	ankle sprain Volleyball	balance board program effective to proprioceptive of ankle sprain recurrent	significantly ankle sprain in intervention group compared to control group (risk difference = 0.4/1000 Playing hours; 95% confidence interval, 0.1-0.7) significantly reduction in ankle sprain risk was found for players with a history of ankle sprain.

Balance Training Program

The definition of balance is the ability to keep the body's gravity within its base of support. Balance also about achieved an interaction of active and passive restraints imposed by the muscular system, reflexive action imposed by the peripheral nervous system (PNS), and anticipatory feed-forward control imposed the central nervous system (CNS) (Behm & Anderson, 2006). Optimum sensory control is designed to prepare, maintain, anticipate, and restore stability of the entire human movement system (postural stability) as well as each segment of the human movement system (joint stability) (Bergmark, 1989).

The balance training program for prevention of ankle sprain was studied. The effect of proprioceptive balance board training program significantly fewer ankle sprains in the intervention group were found compared to the control group (risk difference = 0.4/1000 playing hours). a significant reduction in ankle sprain risk was found only for players with a history of ankle sprain (Verhagen et al., 2004). Specific sport used balance training programme to efficacy the incidence of ankle sprain in basketball for 22 weeks performed 3 times a week to 5 to 10 minutes showed a significantly lower incidence of lateral ankle sprains in the Intervention group compared to control group (Cumps et al., 2007). Balance training for soccer injuries prevention showed that both training groups (intervention group and control group) improved their balance ability similarly despite the different frequency on the balance training program (Gioftsidou et al., 2012).

The other studied showed that balance training program significantly lower on the risk of ankle sprains in the intervention group 6.1%, 1.13% of 1000 exposure vs 9.9%, 1.87 of exposure) athletes with a history of ankle sprain had a 2 fold increased risk of sustaining a sprain (risk ratio 2.4), where athletes who performed the intervention program decreased their risk of sprain by on half (risk fact 0.56). No significant athlete without previous sprain in intervention group and control group (McGuine & Keene, 2006).

Research has demonstrated that balance training restores dynamic stabilization mechanism, improves neuromuscular efficiency and stimulates joint and muscle receptors to encourage maximal sensory input to the central nervous system. Acting collectively, this improves proprioception, kinesthesia, and neuromuscular efficiency (central processing), which in turn can improve performance and reduce injury (Gioftsidou et al., 2006; Kovacs et al., 2004; Paterno et al., 2004; Sforza et al., 2003; Olsen et al., 2005; Padua & Mashall, 2006; Emery et al., 2005; Junge et al., 2002; Soderman et al., 2000, Wedderkopp et al., 2003; Caraffa et al., 1996)

CONCLUSION

Based on the study balance training program 3 times a week 5 to 10 minutes for 22 weeks had effect significantly to reduce ankle sprain in basketball training. The training program 3 times a week for 5 to 10 minutes can be applied to badminton players to prevent of ankle sprains injuries.

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