

CHAPTER 7
DISCUSSION

7.0 DISCUSSION

7.1 INJURY SURVEY

Injury surveillance and prevention are as significant as early detection and treatment. This study is believed to be the first, to throw light on the injury patterns and mechanisms among elite domestic cricket players in India. Orthopaedic injuries that were previously reported at by Punjab Cricket Association (Dhillon et al., 2012) denoted a prominent anatomical site of injury as lower limb followed by upper limb, back and trunk. However, this study deferred in the anatomical sites due to the player profile (unlike the previous study, this study has considered only the first class players representing their State Association), intensity of training, gamut and volume of tournaments played every year. An earlier study on South African cricket players indicated that cricket players are most likely to suffer from muscle followed by joint and tendon injuries (Stretch, 2001). Similarly, this survey also witnessed injuries predominantly to muscles followed by fracture and others, tendon and ligament.

Prevalence rate of injury in this study is much lesser than the previous study from Haryana that indicated 39% (Kumar et al., 2015) and about similar to the study from the Punjab Cricket Association (PCA) (Dhillon et al., 2015) that recorded a prevalence of 10.14%. West Indies Test and One-day international teams have recorded a prevalence of 11.3% and 8.1% respectively (Mansingh, 2006) and an average injury prevalence over a decade of 12.5% in the Australian men's cricket (Orchard et al., 2016). This study confirms that while overuse injuries (sudden/gradual) are the most common mechanism of injury among the young cricket players, it is medium pacers and fast bowlers who are more prone to these injuries. It is the age group of 18-24 (Stretch, 2003) years that has displayed a high vulnerability to overuse injuries.

As demonstrated by previous studies, here too it was noted that lumbar injuries occurred on the non-dominant side of the player (Arora et al., 2014). An earlier study on fast bowlers has also revealed that the fast bowlers had twice the prevalence of pars interarticularis abnormalities versus controls on the non-dominant side (81% vs. 36%) and four times the number of pars abnormalities were recorded on the non-dominant side in fast bowlers as compared to their dominant side (81% vs. 19%) (Ranson et al., 2005). Most common presentations of lumbar spine injuries are in the form of disc degeneration and lumbar spine bony changes. Bony changes may be in the form of stress reaction, chronic stress fracture, and subtotal stress fracture and are seen on the side opposite to the bowling arm.

In 2016 the Australian report on incidence and prevalence of injuries among elite male cricket injuries using updated consensus definitions (Orchard et al., 2016) reported that despite having a lower incidence, it was lumbar stress fractures that caused more missed playing time than hamstring strains. This trend remains true to our study as well, where, though it was shoulder injuries that were distinctly prevalent, it was lumbar spine injuries that resulted in distinct loss of play days, as it took greater recovery time for each lumbar spine injury. This result also supports the findings of the study on the MRI of the lumbar spine in asymptomatic professional fast bowlers in cricket (Ranson et al., 2005) which revealed that low back injuries accounted for greatest loss of playing time for professional fast bowlers in cricket.

Fielding and bowling injuries (Orchard et al., 2015) are seemingly in the forefront as the players are exposed to unique playing conditions, acute workload and game formats that spans through the year. Though the time of onset was mostly during a match and subsequently during training, it was the injuries with gradual onset that indicated highest loss of play days, suggesting a possibility of an inadequate acclimatization to escalated workload. Previous studies have indicated that tendon injuries also appear to be particularly related to variations in workloads. Time and again due to heterogeneous format of tournaments, players often are exposed to different formats in succession through the year. While overuse injuries need attention, underuse injuries, chiefly due to a rapid intensification of workload is of an equal concern (Hulin et al., 2014).

Inadequate acclimatization to escalated workload and heterogeneous format of tournaments have led to an expected high intensity fielding and even the bowlers are compelled to explode with every ball. With intense cricket schedules across the year, the process of recalibrating the mind and muscles from Twenty20 to Test cricket is an extreme challenge. Bundled with this is the packed travel structure through the year. During travel, players most often confront varied climatic conditions, travel fatigue and even an unbalanced diet. This happens to justify their peak month for being prone to injuries as being the month December as shown by this study. During the study it was observed that due to scanty insights on the severity of the injuries, players themselves camouflaged their injuries in order to retain their position in their team.

7.2 YOGA INTERVENTION – MUSCULAR FUNCTIONING

The current research explored the effects of six weeks of *yoga* training on asymptomatic cricket players on the muscular functioning parameters of core stability, flexibility, range of motion, static balance, dynamic balance, and proprioception of the ankle. It also evaluates how well the effect of *yoga* was retained after six months of self-practice. Overall the result of this research indicates that

yoga training has enhanced all the measures under muscular functioning in comparison to the control group.

Preceding studies have emphasised that core stability is crucial in maximising efficient athletic development (Reed et al., 2012) and also in addressing the problems associated with the lumbosacral spine. The deficit in core stability has shown to have increased the risk of upper extremity athletic injuries (Kibler et al., 2006). Studies have also noted that core-focused *yoga* and *yoga*-stabilization combined exercise may be used to enhance the isokinetic trunk strength, body balance, (Park et al., 2015) improve muscle activity and IAP (intra-abdominal pressure) and stability in lumbopelvic region (Gaurav, 2011). The diaphragm serves as the roof of the core, and diaphragmatic breathing that co-ordinates diaphragm, and abdominal muscles are of paramount importance in core-strengthening (Akuthota et al., 2004). Hence, in this study, the *yogic* practices that engage diaphragmatic breathing, in tandem, may have intensified the muscular functioning surrounding the lumbar spine, improving the scores of DLL and SBT in the *yoga* group, as indicated by the results of this study. The findings of the present study are in line with previous studies that have investigated the effect of *yoga* on flexibility. Earlier studies have revealed beneficial improvement due to *yoga* in muscular strength, muscular endurance, flexibility and agility on female hockey players (McClean, 2009), cardiovascular endurance, muscular strength and endurance, and flexibility on Chinese adults (Brynzak, & Burko, 2013), improved hamstring and shoulder flexibility and decline in lower and upper extremity injuries among baseball athletes (Sager, & Grenier, 2014), flexibility, balance and preparedness among basketball players (Polsgrove et al., 2014). The results of this study substantiates previous research, with a highly significant result in the flexibility test of BSR, thus validating the effect of *yoga* on hip region flexibility, including the lower back and hamstring muscles. Evidence suggests that four weeks of *yoga* on a healthy population showed a significant improvement in range of motion of the shoulder and hip compared to static stretching (Tracy et al., 2013). *Yoga* program in the pre-season high volume training among Italian short track speed skating team observed improvements in eleven of the 14 angles measured with no injuries linked to the high volume of training thus signifying possibility to integrate *yoga* in high-volume athlete training and also suggested that *yoga* can be inserted into, out-of-season training cycles (Brunelle et al., 2015). Similar results in the current study exhibited a marked improvement in the *yoga* group in the internal and external rotation of the shoulder in this BASR test. Specifically, shoulder is at high risk of injury in overhead sports, and earlier studies have also indicated a possible dysfunction of the shoulder rotators, combined with a front-on bowling action and external rotation hypermobility being possible predisposing factors for chronic shoulder injuries in cricket among the fast bowlers (Aginsky et al., 2004) and shoulder injuries that are common can also become chronic or recurrent

among cricket players (Ranson, & Gregory, 2008). Glenohumeral Internal Rotation Deficit (GIRD) has been found to be starting at a young age, even among asymptomatic athletes who participate in overhead sports (Hibberd et al., 2014). A recent study with recovery-themed *yoga* training on male baseball pitchers has revealed a significant increase in pelvic flexion, non-dominant shoulder abduction, non-dominant shoulder internal rotation, and dominant trunk rotation (Hansen et al., 2019). Thus, shoulder impairments can be effectively addressed with *yogic* techniques to augment the range of motion and thus, possibly preventing an injury.

Another study on *yoga* training for male college athletes demonstrated an increase in flexibility and balance as well as whole-body measures (Zannotti et al., 2002). The effects of Bikram *yoga* on strength, balance, and steadiness among a younger population found substantial improvements in one-legged balance and modest gains in strength among their participants (McGill et al., 1999). Theoretically, while static balance is the ability to maintain the centre of gravity within a base of support in an upright position while standing or sitting, dynamic balance is maintaining an upright posture while the centre of gravity is moving outside the base of support. Better balance becomes crucial in enhancing athletic performance, and it is negatively associated with lower limb sports injuries. Additionally, ankle proprioception contributes to balance control in sport and provides essential information to enable adjustment of ankle positions and movements of the upper body, to successfully perform the complex motor tasks required in elite sport (Winter et al., 2015). Hence, ankle proprioception that plays a vital role in body balance was studied in the current study. The results are promising in all aspects of static and dynamic balance. The study indicates a significant group(*yoga*)*time(T2 and T3) interaction among all the variables of static balance and dynamic balance showing the overall significant effect of *yoga* on balance. Previous studies have also shown unfavourable outcomes on ankle proprioception due to stress (Senol et al., 2019). This study indicate that though there was no significant fixed effect at either time points (T2 and T3), there was a significant interaction effect (group *yoga**T2) after 6 weeks of the *yoga* intervention in ankle dorsiflexion (11°) and plantar flexion (11° and 25°) with eyes closed. Clearly, practicing *yoga* that aim at establishing an awareness of the body and breath has shown extreme relevance in static balance, dynamic balance, and ankle proprioception in this study.

Though there have been significant results in the follow-up study among most of the variables, the co-efficient of the variables at T3 indicate a slight dip in the values as compared to the values at T2. Non-continuous and selective practicing (choosing only a few practices from the *yoga* module) could have culminated in such an occurrence.

This study has demonstrated the virtues of a *yoga* protocol that can complement routine fitness regime among asymptomatic male cricket players. The strength of this study exists in the control group that comprised of the cricket players of the same caliber which ensured that the differences in outcome were not the result of inequities in physical conditioning but the outcome of the *yoga* intervention. However, the various components of this *yoga* protocol that might benefit in injury rehabilitation are unknown at the time and warrants further investigation.

7.3 YOGA INTERVENTION – MINDFULNESS

The present study was the first of its kind to explore the efficacy of *yoga* in facilitating mindfulness among asymptomatic male cricket players. In today's competitive sporting world, the gap between players physical skills as well as the margin of victory is narrowing. Every player is in a pursuit of achieving sporting excellence. Adopting *yoga* as a holistic mind-body intervention fosters the development of several personal, sport and performance-relevant psychological skills where goal-oriented behaviour and automatic goal-focused processes are facilitated.

The findings of this study indicate that *yoga* training had produced no significant effect of time or group, however, significant interaction effect at T2 among all the facets except for the facet of act with awareness indicate the impact of *yoga* on the facets of observe, describe, non-judging and non-reactivity. The follow-up study indicates no significant interaction effect (group*time interaction) for all the facets at T3. Overall, this study, shows the impact of *yoga* post the 6 weeks of training and no significant impact after 6 months of follow-up, hence this study partially supports the previous study on the effects of *yoga* intervention on mindfulness and dispositional flow of elite youth swimmers (Briegel et al., 2013), where no significant changes in mindfulness and dispositional flow were identified. In the present study, the frequency, intensity and the duration of the *yoga* sessions might have contributed towards significant changes in the outcome measures at T2.

Hatha yoga practices have previously proven to have been beneficial in improving sport performance (Sorbie et al., 2019), facilitating secretion of melatonin from the pineal gland, which may be acting as a psycho-sensitive hormone, improvements in the autonomic balance, respiratory performance and well-being (Harinath et al., 2004). It has also demonstrated to have reduced state anxiety (Telles et al., 2009), enhancing mindfulness and decreasing stress (Brisbon, & Lowrey, 2016; Goodman et al., 2014), greater goal-directed energy (Goodman et al., 2014), upregulating the antioxidant capacity of cells to combat oxidative stress (Sinha et al., 2007), and also facilitating self-regulation and mindful awareness by cultivating 'witness consciousness' (Gard et al., 2014).

Another study on participants from Vipassana and Zen meditation has shown that the mindfulness components non-judge and act-aware were significant predictors of depression. Non-judge is seen as a significant predictor of anxiety and stress (Cash, & Wittingham, 2010). In line with the earlier studies that validated the advantages of *yoga* on mental well-being, this study also demonstrated that a comprehensive *yoga* module that encompasses postures, breathing techniques and deep relaxation is likely to increase the cricket player's ability to maintain a state of mindfulness.

During the follow-up period, not practicing the *yoga* module in its entirety or being irregular in their *yoga* practice might have resulted in no changes in the facets of mindfulness. This clearly indicates that long term benefits of *yoga* on mindfulness can be brought about chiefly by internalising the practices by the players into their lives off the mat as well. Continuous and sustained practice will be beneficial in adapting to emotional and homeostatic perturbations of their daily life.

Further investigation on the mechanisms underlying the effect of *yoga* on mindfulness in performance of the cricket players needs to be undertaken. Future studies can delve into the *yoga* practices that can be beneficial before an actual match, effect of one-on-one *yoga* training, and also an in-depth qualitative analysis on the benefits of *yoga* on cricket players that stretch beyond the sport.

In the next section, this study is concluded by presenting the appraisal.