REVIEW OF RELATED LITERATURE

Gatterer H, et al. (2011) studied and found that body composition is highly modifiable through exercise and may be changed by the physical stress of soccer training and competition. Especially body water as a constituent of body composition is assumed to be subjected to changes. It is speculated that during the most important soccer championship the combination of heat and the strenuous competitive program could lead to the development of a chronic state of hypohydration. However, no one tested this hypothesis. Therefore, the purpose of present work was to investigate the impact of the European Soccer Championship 2008 on players’ body composition.

After the first game, Starters and Non-Starters showed decreased extra-cellular mass (-3.3% and -5.5%) and body cell mass (-4.1% and -6.1%) compared to pre championship measurements. The impedance vector graph showed a significant lengthening in both groups (Starters $T^2=30.5$, $P=0.000$; Non Starters $T^2=39.0$, $P=0.000$). After the second game, extra-cellular mass (-3.4%) and body weight (-1.1%) decreased in Starters only.

ANOVA revealed a significant difference in extra-cellular mass between Starters and Non-Starters ($P=0.027$). The impedance vector graph was lengthened in the Starters only ($T^2=17.5$, $P=0.000$). The distance covered during the games was correlated to the percent drop in extra-cellular mass between the end of games 1 and 2 ($r=-0.602$; $P=0.023$).

Fousekis and Vagenas (2010), conducted study on Soccer players possess various degrees of functional footedness. Their lower limbs are subjected to consistent asymmetrical workloads and neuromuscular adaptations, and as a result develop asymmetrical patterns of musculoskeletal function. This study focused on the myodynamic profile of the knee and ankle joint in professional soccer players. Special emphasis was put on the multivariate quantification of three types of asymmetry: directional (left vs. right), fluctuating (dominant vs. non dominant) and absolute (left vs. right).

One-hundred professional soccer players (mean age 23.4 years, weight 73.3, height 177.6) were tested isokinetically for concentric and eccentric isokinetic muscle strength (1) of the knee flexors and extensors, and (2) of the ankle dorsal and plantar flexors. Knee flexion-extension was tested at 60o, 180o and 300o/s for the concentric mode of contraction and at 60o
and 180°/s for the eccentric. The ankle joint was tested only at 60°/s for both the concentric and eccentric action.

MANOVA showed significances for all three types of strength asymmetry (joint and action combined): directional (Wilks' $\Lambda=0.66$, $F=2.957$, $P=0.001$), fluctuating (Wilks' $\Lambda=0.61$, $F=2.957$, $P=0.007$), and absolute asymmetry (Wilks' $\Lambda=0.47$, $F=116.26$, $P=0.000$). Several significant asymmetries were also revealed at the univariate level of analysis ($P<0.05$).

It seems that the lower limbs of professional soccer players are characterized by significant compound muscle strength asymmetries. These findings substantiate the idea of asymmetry in the myodynamic adaptations that take place at the knee and ankle joint of soccer players during the game. Individual modification of the training load, targeting in strength asymmetry correction, should be taken into consideration for injury prevention.

McMorris and Graydon (1997) carried out two experiments to examine the effect of moderate and maximal exercise on the cognitive performance of experienced soccer players. Experiment 1 examined the speed and visual search in familiar (game) and unfamiliar (non-game) contexts.

Experiment examined the effects of exercise on speed of search, speed of decision following ball detection, overall speed of decision and accuracy of decision at rest and while exercising at 70 and 100% maximum power output. A repeated-measures multivariate analysis of variance and Tukey post-hoc tests showed that performance during exercise was significantly better than at rest.

Observation of the separate univariate analyses of variance demonstrated that most of the variance could be accounted for by overall speed of decision and speed of decision after ball detection. They concluded that exercise induces not only an improvement in a simple task, like speed of visual search, but also an overall increase in speed of information processing. Theories concerning the effect of emotionally induced arousal on cognitive performance do not accurately predict the effect of physically induced arousal on cognitive tasks.

Hermassi et al. (2010) studied with the aim to compare the effect of 2 differing 10-week resistance training programs on the peak power (PP) output, muscle volume, strength, and throwing velocity of the upper limbs in handball players during the competitive season.

The subjects were 26 men (age 20.0 +/- 0.6 years, body mass 85.0 +/- 13.2 kg, height 1.86 +/- 0.06 m, and body fat 13.7 +/- 2.4%). They were randomly assigned to 1 of 3 groups:
control (C; n = 8), heavy resistance (n = 9), or moderate resistance (MR; n = 9) training, performed twice a week. A force-velocity test on an appropriately modified Monark cycle ergometer determined PP. Muscle volumes were estimated using a standard anthropometric kit. One-repetition maximum (1RM) bench press (1RMBP) and 1RM pull-over (1RMPO) scores assessed arm strength. Handball throwing velocity was measured with (TR) and without run-up (TW).

Heavy resistance also increased TR and TW compared to C (p < 0.01 and p < 0.05, respectively). Moderate resistance increased only TR compared to C (p < 0.01). Thus, during the competitive season, the PP, 1RMBP, 1RMPO, and TW of male handball players were increased more by 10 weeks of bench press and pull-over training with suitably adapted heavy loads than with moderate loads. It would seem advantageous to add such resistance exercise before customary technical and tactical handball training sessions.

Rontu et al. (2010), calculated that the one repetition maximum (1RM) is an important method to measure muscular strength. The purpose of this study was to evaluate a new method to predict 1RM bench press performance from a submaximal lift. The developed method was evaluated by using different load levels (50, 60, 70, 80, and 90% of 1RM). The subjects were active football players (n = 22).

An own estimation equation was developed for each load level, that is, 5 different estimation equations have been used based on the measured 1RM values of the subjects. The mean (+/-SD) of measured 1RM result was 69.86 (+/-15.72) kg. The mean of estimated 1RM values were 69.85-69.97 kg. The correlations between measured and estimated 1RM results were high (0.89-0.97; p < 0.001). The differences between the methods were very small (-0.11 to 0.01 kg) and were not significantly different from each other.

The results of this study showed promising prediction accuracy for estimating bench press performance by performing just a single submaximal bench press lift. The estimation accuracy is competitive with other known estimation methods, at least with the current study population.

Molacek (2010), conducted study with the purpose to determine the effects of acute low-and high-volume static and proprioceptive neuromuscular facilitation (PNF) stretching on 1-repetition maximum (1RM) bench press. Fifteen healthy male National Collegiate Athletic Association Division II football players (age: 19.9 +/- 1.1 years; weight: 98.89 +/- 13.39 kg;
Subjects completed 5 different stretching protocols integrated with a 1RM dynamic warm-up routine followed by 1RM testing in randomly assigned order.

There were no significant differences in 1RM bench press performance (p > 0.05) among any of the stretching protocols NS (129.7 +/- 3.3 kg), LVPNFS (128.9 +/- 3.8 kg), HVPNFS (128.3 +/- 3.7 kg), LVSS (129.7 +/- 3.7 kg), and HVSS (128.2 +/- 3.7 kg). We conclude that low- and high-volume PNF and static stretching have no significant acute effect on 1RM bench press in resistance-trained collegiate football players.

This suggests that resistance-trained athletes can include either (a) a dynamic warm-up with no stretching or (b) a dynamic warm-up in concert with low- or high-volume static or PNF flexibility exercises before maximal upper body isotonic resistance-training lifts, if adequate rest is allowed before performance.

Comyns, Harrison and Hennessy (2010), undertook this study to examine the effect of a heavy weight training exercise on sprinting performance and on the effect of repeated exposure to a complex training protocol. Eleven male rugby union players (age 20.9 +/- 3.1 years) participated in the study, which involved 5 separate testing sessions. Back squat 3 repetition maximum (3RM) was established in session 1. Sessions 2-5 were identical and involved the subjects completing a 30-m sprint before and after a 3RM back squat protocol. Four minutes of rest was given between the back squatting and the posttest 30-m sprint.

The criterion for significance was set at an alpha level of p > or = 0.05. No significant improvement was evident for any of the testing sessions (p > or = 0.05). In session 1, there was a significant increase in 30-m time and a significant reduction in average 30-m velocity and maximum velocity (p < 0.05).

The session x phase interaction revealed a significant improvement in the pre to posttest changes in instantaneous velocity at 20 m (p = 0.035) and 30 m (p = 0.036) from session 1 to session 4. This indicates that the rugby players may be able to learn to apply the potentiation effects of complex training. From a practical perspective, players may need repeated exposure to this training modality to gain benefit from it, and this should be reflected in program planning.

Baker and Newton (2009), theorized that the force and velocity profile of a repetition performed during a standard barbell exercise may be altered by substituting suspended chains for
some portion of the total resistance. The purpose of this study was to document the alterations in lifting velocity that occur when the bench press exercise is performed as standard (BP) or with the substitution of resistance via chains draped over the barbell (BP+CH).

Thirteen professional rugby league players participated in this study as part of their usual training program. Each subject performed 2 sets of 3 repetitions under the following conditions: The BP+CH condition, where the barbell resistance of 60% 1RM (repetition maximum) was supplemented by 17.5-kg in chains draped over the barbell (total resistance was about 75% 1RM), and the BP condition, where the total resistance was the same but was constituted in the form of standard barbell weights. The BP+CH condition resulted in increases in mean and peak concentric lifting velocities of around 10% in both sets as compared to both BP sets.

Eccentric peak velocities were more varied in response, but generally the addition of chain resistance could be said to allow for increased velocities. The result may be partially explained by the eccentric unloading that occurs as the chain links furl upon the floor in the latter stages of the eccentric range. This eccentric unloading precipitates a more rapid stretch-shorten cycle (SSC) transition and possibly a within-repetition post activation potentiation (PAP) that allows the subject to utilize faster lifting velocities in the initial concentric portion, which flow through to the remainder of the concentric phase. Therefore the use of chains appears warranted when athletes need to lift heavy resistances explosively.

Sedano et al. (2009) with the aim for the present study conducted to examine how explosive strength, kicking speed, and body composition are affected by a 12-week plyometric training program in elite female soccer players. The hypothesis was that this program would increase the jumping ability and kicking speed and that these gains could be maintained by means of regular soccer training only.

Twenty adult female players were divided into two groups: control group (CG, n = 10, age 23.0 +/- 3.2 yr) and plyometric group (PG, n = 10; age 22.8 +/- 2.1 yr). The intervention was carried out during the second part of the competitive season. Both groups performed technical and tactical training exercises and matches together. However, the CG followed the regular soccer physical conditioning program, which was replaced by a plyometric program for PG. Neither CG nor PG performed weight training.
The PG demonstrated significant increases (p < 0.05) in jumping ability after 6 weeks of training and in kicking speed after 12 weeks. There were no significant time x group interaction effects for body composition.

It could be concluded that a 12-week plyometric program can improve explosive strength in female soccer players and that these improvements can be transferred to soccer kick performance in terms of ball speed. However, players need time to transfer these improvements in strength to the specific task. Regular soccer training can maintain the improvements from a plyometric training program for several weeks.

Baghurst and Lirgg (2009) conducted this study with the purpose to identify differences in traits associated with muscle dysmorphia between collegiate football players (n=66), weight trainers for physique (n=115), competitive non-natural bodybuilders (n=47), and competitive natural bodybuilders (n=65). All participants completed demographic questionnaires in addition to the Muscle Dysmorphia Inventory (Rhea, Lantz, & Cornelius, 2004).

Results revealed a significant main effect for group, and post hoc tests found that the non-natural bodybuilding group did not score significantly higher than the natural bodybuilding group on any subscale except for Pharmacological Use. Both the non-natural and natural bodybuilding groups scored significantly higher than those that weight trained for physique on the Dietary Behavior and Supplement Use subscales. The collegiate football players scored lowest on all subscales of the Muscle Dysmorphia Inventory except for Physique Protection where they scored highest.

Harrison and Bourke (2009), found that various studies have demonstrated resistance sprint (RS) training can produce significant changes in running speed and running kinematics. The longer-term training adaptations after RS training remain unclear.

The purpose of this study was to investigate whether an RS training intervention would enhance the running speed and dynamic strength measures in male rugby players. Fifteen male rugby players aged 20.5 (+/- 2.8) years who were proficient in resisted sledge training took part in the study. The subjects were randomly assigned to control or RS groups. The RS group performed two sessions per week of RS training for 6 weeks, and the control group did no RS training.

Pre- and post intervention tests were carried out for 30-m sprint, drop, squat, and rebound jumps on a force sledge system. A laser measurement device was used to obtain velocities and
distance measures during all running trials. The results show a statistically significant decrease in time to 5 m for the 30-m sprint for the RS group (p=0.02). The squat jump and drop jump variables also showed significant increases in starting strength (p = 0.004) and height jumped (p = 0.018) for the RS group from pre- to post-testing sessions. The results suggest that it may be beneficial to employ an RS training intervention with the aim of increasing initial acceleration from a static start for sprinting.

Drinkwater et al. (2007) found with some research suggests that strength improvements are greater when resistance training continues to the point at which the individual cannot perform additional repetitions (i.e., repetition failure). Performing additional forced repetitions after the point of repetition failure and thus further increasing the set volume is a common resistance training practice. Compared with the 8 x 3 group, the 4 x 6 protocol involved a longer work interval and the 12 x 3 protocol involved higher training volume, so each group was purposefully designed to elicit a different number of forced repetitions per training session. Subjects were tested on 3- and 6-repetition maximum (RM) bench press (81.5 +/- 9.8 and 75.9 +/- 9.0 kg, respectively, mean +/- SD), and 40-kg Smith Machine bench press throw power (589 +/- 100 W).

The 4 x 6 and 12 x 3 groups had more forced repetitions per session (p < 0.01) than did the 8 x 3 group (4.1 +/- 2.6, 3.1 +/- 3.5, and 1.2 +/- 1.8 repetitions, respectively), whereas the 12 x 3 group performed approximately 40% greater work and had 30% greater concentric time. As expected, all groups improved 3RM (4.5 kg, 95% confidence limits, 3.1-6.0), 6RM (4.7 kg, 3.1-6.3), bench press throw peak power (57 W, 22-92), and mean power (23 W, 4-42) (all p < or = 0.02). There were no significant differences in strength or power gains between groups. In conclusion, when repetition failure was reached, neither additional forced repetitions nor additional set volume further improved the magnitude of strength gains. This finding questions the efficacy of adding additional volume by use of forced repetitions in young athletes with moderate strength training experience.

Sidiropoulou et al. (2007) explained a lot of emphasis has been placed in screening individuals with exercise-induced bronchospasm in order to avoid persistence bronchial hyperactivity and consequent chronic silent inflammation of the respiratory tract. The purpose of this study was to evaluate the effect of interval training on the respiratory function and endurance in children with exercise-induced asthma (EIA) participating in the sport of soccer. Twenty-nine boys ages 10-14, who developed EIA after a 6-minute free running test (decline in forced
expiratory volume in 1 second: FEV (1)10%), participated in the study. They were divided into 2 groups (experimental: n = 18, and control: n = 11), fulfilling the same criteria (i.e., age, body height and weight, and severity of asthma). The experimental group exercised with the interval training method for a period of 8 weeks, (3 sessions per week), whereas the control group exercised with the usual football program.

Measurements were made for FEV (1) and endurance in both groups, before and after the application of training (8 weeks). Following the implementation of the training program, a significant improvement in FEV (1) and endurance was documented in the experimental group, as well as significant differences between the 2 groups. In conclusion, duration and aerobic training via the interval method seems to be beneficial to soccer players with EIA.

Manolopoulos et al. (2006) conducted this study with the aim to examine the effect of a soccer (strength and technique) training program on kinematics and electromyographic (EMG) muscle activity during a instep kick. Ten amateur soccer players (aged 19.9+/-.0.4 years, body mass 74.8+/-.9.1 kg, height 177.4+/-.6.7 cm) constituted the experimental group (EG) whereas 10 players (age 21.6+/-.1.3 years, weight 71.5+/-.6.7 kg, height 175.2+/-.3.4 cm) served as controls (CG).

The EG followed a 10-week soccer-specific training program combining strength and technique exercises. All participants performed an instep soccer kick using a two-step approach while three-dimensional data and EMG from six muscles of swinging and support legs were recorded prior to and after training. Maximum isometric leg press strength, 10-m sprint performance and maximum speed performance on a bicycle ergometer were also measured.

Analysis of variance designs with repeated measures showed that the EG improved significantly (P<0.05) maximum ball speed, the linear velocity of the foot, ankle and angular velocity of all joints during the final phase of the kick. Training had insignificant effects on EMG values, apart from an increase in the averaged EMG of the vastus medialis whereas maximum isometric strength and sprint times significantly improved after training (P<0.05). The present results suggest that the application of the training programs using soccer-specific strength exercises would be particularly effective in improving of soccer kick performance.

Beck and Doecke (2005) conducted this study with the purpose to observe the relationship of field hockey playing with bone, muscle and fat in young and older adult women. Body composition was measured by dual energy X-ray absorptiometry (DXA) in college players,
senior players and controls after a 4-month playing-season and 8-month off-season. Whole body (WB), proximal femur (PF), lumbar spine (LS), right and left forearm (RF, LF) bone mineral density (BMD), percent fat and lean mass of college players (20.6+/−1.1 years; 7.7+/−1 playing years) were compared with those of non-playing controls (19.5+/−1.5 years). BMD of senior players (37.3+/−10.3 years; 19.7+/−9.3 playing years) was compared to normative values. The differences between right and left forearm BMDs during the on and off seasons were also compared. College player BMD was higher than controls at the WB (p=0.02), PF (p=0.00004), RF (p=0.006) and LF (p=0.005), but not the LS. Senior player BMD was higher than age-matched norms at the WB (p=0.001) and PF (p=0.006), but not the LS, RF or LF.

There were no differences between on and off-season BMDs for either group also college player RF and LF BMD in either season, nor in the senior players during the off-season, however, during the season, senior players developed greater RF than LF BMD (p=0.02). College players had greater lean mass (p=0.00008) and lower fat mass than controls (p=0.003). Senior players lost fat (p=0.04) and gained lean mass (p=0.02) in season. Adult female field hockey players have higher than average bone mass that does not change significantly according to seasonal involvement.

According to Wisløff et al. (2004) A high level of strength is inherent in elite soccer play, but the relation between maximal strength and sprint and jumping performance has not been studied thoroughly. To determine whether maximal strength correlates with sprint and vertical jump height in elite male soccer players. Seventeen international male soccer players (mean (SD) age 25.8 (2.9) years, height 177.3 (4.1) cm, weight 76.5 (7.6) kg, and maximal oxygen uptake 65.7 (4.3) ml/kg/min) were tested for maximal strength in half squats and sprinting ability (0-30 m and 10 m shuttle run sprint) and vertical jumping height.

There was a strong correlation between maximal strength in half squats and sprint performance and jumping height. Maximal strength in half squats determines sprint performance and jumping height in high level soccer players. High squat strength did not imply reduced maximal oxygen consumption. Elite soccer players should focus on maximal strength training, with emphasis on maximal mobilisation of concentric movements, which may improve their sprinting and jumping performance.