ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 8 | August 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 7.032 ||ISI Value: 1.188

EFFECT OF HORMONES SECRETION & NUTRITION LEVEL ON HEALTH: A REVIEW

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ABSTRACT

Now a day, everyone needs to fit and health. Secretions of hormones and nutrition level should be maintained for health. Chemical messengers of the body are known as hormones. These are travelling through bloodstream and help the tissues and organs to do their proper works. Body releases several types of hormones it acts on different aspects of bodily functions. Body building is a progressive resistance exercise. It can help to control and develop musculature. A person which are engaged in this is known as body builder. Body builder performed different types of poses in body building competitions. Throughout competitions body builders eliminated the nonessential body fat, enhanced the combination of extracellular dehydration and carbo-loading for maximum muscle vascularity. supplements are most important in body building. It will used by both the sex male and female. whey protein, chromium picolinate, omega 3 fatty acids, BCAA, poly-vitamins, glutamine and caffeine are some supplements used by body builders during workout.

KEYWORDS- ***hormones, body-building, supplements***

INTRODUCTION

Chemical messengers of the body are known as hormones. These are travelling through bloodstream and help the tissues and organs to do their proper works.[1,2] Body releases several types of hormones it acts on different aspects of bodily functions.[1] In human body, hormones are released from several glands. It may be required for growth, development, reproduction etc.[3,4] These hormones coordinate the activity of human body and living organism for their growth and development. Endocrine glands help them to release from special tissues in human body.[5,6]

Hormone can produce many effects on human body. Different types of hormones produce different types of actions. Some hormones are do their jobs very quickly and stopped but some hormones are for long period of time and had their effects for long periods.[7,8,9]

FUNCTION OF HORMONES

1. Thyroid hormones

Thyroid hormones release from thyroid gland. It released basically two hormones T3 (triiodothyronine) and T4 thyroxine. These hormones control the metabolism system and also helps in regulate the weight, energy level determination, body temperature. It also has some effects on hairs and skins.

2. Insulin

Insulin is secreted by pancreas. Pancreases located behind the stomach. It has a leaf like structure. Carbohydrates which are presents in foods, pancreases help body to use glucose or sugar from them. It gives energy and store the glucose for future work. These hormones help to regulate or keeping the blood sugar level to getting high. In higher cases it is known as hyperglycaemia and in lower cases it is hypoglycaemia.

3. Estrogen

Estrogen is released by ovaries know as female sex hormones. This hormone is responsible for starting of menstruation cycle and for menopause. It is also help in reproduction. If excess amount of estrogen is released by ovaries it can causes breast cancers, uterine cancers, moodiness etc. if sufficient amount of estrogen are not released into the body it may causes acne, skin lesions, hair losses etc.[10,11,12]

4. Progesterone

Progesterone hormone is also released by ovaries. It helps regulate various function of female body. mainly it is responsible for maintaining pregnancy and also helps to regulates monthly cycle. If the progesterone level dropped, pregnancy does not occur. plays a role in sexual desire.

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5. Prolactin

Pituitary gland released prolactin hormone. It will be released after childbirth for lactation. It enables breastfeeding. During Pregnancy, prolactin hormones are released. It also helps in fertility by inhibiting follicle-stimulating hormone and gonadotropin-releasing hormone.[13,14,15]

6. Testosterone

Testosterone is a male sex hormone. Testosterone is also help in body building muscles and also an anabolic steroid by nature. It helps to develop the male reproductive tissues and also help to increase in body mass, body hairs etc. frailty and bone loss may occur if sufficient amount of hormones are not released.

7. Serotonin

This hormone is responsible for boosting the mood and also known as chemical of feel good. Serotonin helps in regulating the sleep, increase the memory and learning power, some muscles functions etc. if the sufficient amount of hormones are not released in the body it may affect the brain and also affect the mood and increase the stress level. It may lead to depression, migraine, insomnia and craving of carbohydrate etc. if very much amount of serotonin is produced by body it may lead to causes agitation, stage of confusion and sedations etc.[16,17]

8. Cortisol

For remain healthy and energetic cortisol hormones are very much important for body. it helps to control the physical and psychological stress. It may affect very badly to body if dangerous conditions are occurred it may increase the heart, blood pressures and can decreases the respiration etc. it may also occur the ulcers, high blood pressures, anxiety etc. chronic fatigue syndrome was occurred if it releases in less amount.[18,19,20]

9. Adrenaline

Adrenal gland secret adrenaline hormone. It is an emergency hormone; it gives the quick reactions for thinking and quick reactions to stress. Adrenaline hormones increase the metabolic rate, dilation of blood vessels and brain. It releases quick into the blood and send impulse to organ for a specific reaction during the stressful conditions.

10. Growth Hormone

Growth hormones are also known as somatotropin hormones. Somatotropin hormones contain a protein hormone which helps to synthesised and regulate the growth, cell reproduction, cell regeneration and boosting metabolism.[21,22,23]

1.3 Hormonal signalling

Hormones are releases for growth and maintenance of human body. it goes through the blood and the signals were carryout to the target. There are some important hormones signals-[24,25,26]

- Intracrine- it acts on cells by intracellularly and help them to synthesized it.
- Autocrine- it effects on cell and causes a biological effect.
- Paracrine – it does not enter into general circulations but acts on nearby cells.
- Endocrine- before released into bloodstream, it acts on target cells.

BODY BUILDERS

Now a days, everyone needs to be healthy and fit. Natural bodybuilding has taken the popularity, rapidly. There are some contests of body building may occur in different countries. In this contest many body builders can take part. body building preparations involves reduction of fats for maintain of muscle mass. It can be achieved by intake of sufficient amount of calories, intense strength training and increased cardiovascular exercise.[27,28,29] During pre-contest period body builders has to reduces the body fats to very low levels. In this number of sets and repetitions were increases and other resistance. This may also help to burn the fats which may results in loss of muscle mass. Aerobic exercise may also help to reduces the fats. Muscles mass acceleration is the main goal in off-session body builder makes positive energy balance. Heavy weight exercise may give muscles accretion.[30,31,32] Some proteins are also required for that. Time of protein intake are most important for muscles mass. For high intense resistance tanning carbohydrate are most important. Carbohydrates helps to synthesis of muscles glycogen. Many body builders use anabolic steroids and also different types of drugs which help them to maintain and growth of body, may also help to recover from injuries. Now a days, in many competitions use of this drug are banned.[33,34,35]

BODY BUILDING DIETS

1. FOODS TO EAT

- **Meats, poultry and fish:** Sirloin steak, ground beef, pork tenderloin, venison.
- **Dairy:** Yogurt, cottage cheese, low-fat milk and cheese.
- **Grains:** Bread, cereal, crackers, oatmeal, quinoa, popcorn and rice.
- **Fruits:** Oranges, apples, bananas, grapes, pears, peaches.
- **Starchy vegetables:** Potatoes, green peas, green lima beans.
- **Vegetables:** Broccoli, spinach, leafy salad greens, tomatoes, green beans,
- **Seeds and nuts:** Almonds, walnuts, sunflower seeds, chia seeds and flax seeds.
- **Beans and legumes:** Chickpeas, lentils, kidney beans, black beans.
- **Oils:** Olive oil, flaxseed oil and avocado oil.[36,37,38]

2. FOODS TO AVOIDED

- **Alcohol:** excess amount of alcohol consumption may affect muscle and lose fat.
- **Added sugars:** Foods high in added sugars include candy, cookies, doughnuts, ice cream, cake and sugar-sweetened beverages, such as soda and sports drinks.
- **Deep-fried foods:** These may promote inflammation and disease. it includes fried fish, French fries, onion rings, chicken strips and cheese curds.[39,40,41]

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NUTRITIONS COMPOSITION FOR BODY BUILDING

1. Calories and macronutrients

For competition body builders may increases their diet which are low in calories but energy expenditures are more. During this muscle maintenance and fat loss are important. At this time optimal caloric intake, deficits and macronutrients combinations are used. In this weight loss and more energy can be expended than consumed. By reducing caloric intake, these can be increasing caloric expenditures. Weight lost is depend on size of caloric deficit and length of time. Normal body can metabolize yield of 3500 kcals, for daily deficit is 500 kcals. A dynamic model does not represent the physiological adaptations. 50% of the caloric was consumed in first 24 week of competitions and 40% reduction in their baseline energy expenditure.[42,43,44]

2. Protein

Proteins are most important for body building. It can support the muscles for maintenance. Body builders require high amount of proteins. It also helps to increases the strength and increase the activity. 1.2 to 2.2 g/kg is sufficient for a normal body but body builders require more proteins. Thus, it is proved that protein intake is more during competition.

3. Carbohydrate

For better performance body builder need more amount of carbohydrates. It can give strength for training and also reduces the glycogen depletions it may enhanced the performances. Glycogen is the main fuel sources. Fat loss are done by lower carbohydrate diets and also not for performance and health.[45,46]

4. Fat

Carbohydrate and protein are most important in sports nutrition over dietary fat. Maintenance of fats are most important. It emphasizing carbohydrates to performance and protein for build and repair of low body mass. dietary fat influences anabolic hormone concentrations. It can help bodybuilders to maintaining LBM. isocaloric diets may reduce 40% to 20% of testosterone levels. For competitions body builders takes obligatory caloric reduction.

2.4.5 Ketogenic diets

These diets contain high fat, adequate amount of proteins, low amount of carbohydrate diet. It is also used as a medicine in epilepsy. In this condition, diet force the body for fat burning rather than carbohydrate. Carbohydrates converted into glucose. It is very important for brain functions. For lower the epileptic seizures, ketone must be elevated from the blood.[47,48,49]

HISTORY OF BODY BUILDING

At first the weight lifting comes into play. It was starting from stone lifting traditions which were practiced into Egypt, Greece and tamilakam. Eugen Sandow is the father of bodybuilders. It was started from late 19th century. At first body building is used to show their strength, demonstrations or wrestling matches.[50,51,52]

1. 1950s–1960s

In 1950 and 1960 body building becomes more popular. These are for emergence of strength and gymnastics champions.[53,54] There are many body building organisations. IFBB (international federations of bodybuilding were stabilized in 1946. In 1965, the most prestigious titles were Mr. America, Mr. World, Mr. Universe, Mr. Galaxy, and ultimately Mr. Olympia was given. Advertisement of gold gym is been started in mid1960.[55,56]

2. 1970s–1990s

In early 1970s body building becomes the most popular and most important publicity. In 1981 national physique committee was formed. It becomes the most popular bodybuilding organisation in America and the amateur division of IFBB. In this period anabolic steroids are also used for body building and it may continue through 1980 and 1990.[57,58] These anabolic steroids help to develop and growth of body. in late 1970, the use of anabolic steroids are openly discussed. In 1970, Vince McMahon found a new organization of body building name WBF (world body building federation). In this sport bigger prizes money and showmanship were given.[59,60]

3. 2000s

In 21st century consumptions and recreation become the more popular. IFBB makes body building an Olympic sport but many of them argue that it is not a sport.[61,62]

PRE AND POST WORKOUT SUPPLEMENTS FOR MAXIMIZE THE PERFORMANCE OF BODY BUILDERS

1. Creatine

The safest supplements are creatine monohydrates. It cannot affect any part of the body like liver and kidneys. During training programme this were produces significant effects and increases the muscle mass and give strength. Marketed products are CEE (creatine ethyl ester) and KA (kre alkalyn).[63,64]

2. Beta-alanine

It is a natural occurring beta amino acid in which the amino group is at β- positions in carboxylate group. It is the most popular supplements in body building. It enters into circulation and goes to skeletal muscles where carnosine is synthesized. It may help to decreases the fatigue and increases the muscle tone. When it taken orally it break into histidine and β-alanine.[65,66]

3 HMB (Beta-hydroxy-beta-methyl butyrate)

It is also a conjugate base. It naturally occurring in human body. it is also used a dietary supplements and medical foods that helps for wound healing and for muscles wasting due to HIV or cancer. It may help to gain the muscle sizes, muscle strength and lean body mass. It may lead to improve aerobic exercise performances and recovery of body. these may help to increases the lean body mass and muscle strength.[67,68,69]

4. Branched chain amino acids

Amino acids having an aliphatic side chain is known as branched-chain amino acid (BCAA). BCAA contains three amino acids: leucine, isoleucine and valine. Humans contains nine essential amino acids. Muscle proteins contains 35% of essential amino acid.[70,71] BCAA may be synthesis at all location of plants. It may

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determine by presence of mRNAs, which encoded for enzymes in metabolic pathways. It also helps in synthesis of proteins, signal pathways and metabolism of glucose. BCAA may be oxidised it may increase the fatty acid and play a role in obesity.[72,73] It also helps in immune system and brain functions. dehydrogenase and decarboxylase enzymes may broken down the BCAA. It is also helps in growth of lymphocytes and proliferation and cytotoxic T lymphocytes activity.[74]

5. Arginine

Arginine contains α- amino acid, α-carboxylic acid and a side chain. This helps to synthesis of proteins. It is a semi-essential or essential amino acid. Protein containing foods may complete the need of arginine it can be synthesized in the body from glutamine. It is a precursor of NO. NO is the signalling molecule it acts like a secondary messenger.[75,76] It can regulate vasodilation and also helps immune system to fight against infections. For the synthesis of creatine some precursors like urea, ornithine and agmatine is used. asymmetric dimethylarginine (ADMA) is used for vascular diseases.[77,78]

6. Citrulline malate

It is a naturally occurring amino acids. It is a non-essential amino acid. These are founds in some foods like watermelons and also produced naturally. It is used for heart failure patients and also used for improving athletic performance. It also helps for the production of nitric oxide. It may help in potent vasodilator modulating blood flow and oxygen delivery into the body.[79,80] during exercise body needs oxygen for energy productions, citrulline Malte produces more NO which leads to greater supply of oxygen to working muscles.[81]

7. Glutamine

Glutamine contains α- amino acid. It is used for the biosynthesis of proteins. Side chain is similar to glutamic acid, carboxylic acids are replaced by amines. It contains charge-neutral, polar amino acid. It is both essential and non-essential, so that it can synthesized into the body. in blood it is a most abundant free amino acid. Sources of glutamines are like beef, chicken, fish, eggs, vegetables etc.[82,83]

8. Caffeine

Caffeine can stimulate the central nervous system. It is a class of methylxanthine. It is also known as psychoactive drug. It helps to block the action of adenosine and prevents the onset of drowsiness. It can also stimulate autonomous nervous system. It is chemically related to adenine and guanine bases of deoxyribonucleic acid (DNA) and ribonucleic acid.[84,85] It may help to treat the premature infant breathing disorders. It may give some protective effect against some diseases. It can produce some drug dependence. It also has some withdrawal symptoms like sleepiness, headache and irritability.[86,87]

PHYSIOLOGICAL AND BIOLOGICAL ASPECT OF HORMONE LEVEL IN MALE AND FEMALE BODY-BUILDER

Now a days, bodybuilders may abuse the anabolic androgenic steroids. It is a synthetic compound which are similar to testosterone and dihydrotestosterone hormones. Anabolic steroids have ethyl, methyl, hydroxyl or benzyl groups. AAS may have low chronic risks as compare to tobacco and alcohol.[88,89] There are some hormones which may affects the body builders.

1. GROWTH HORMONE

Growth hormones stimulates the growth, helps in cells reproduction and cell regenerations. It is the most important hormones in human. It can also stimulate the production of IGF-1 hormones. It may increase the concentrations of glucose and free fatty acids. INN (somatreopleopin) is the recombinant form of human growth hormones. Its helps to treat the children and adult growth hormones deficiency. Many bodybuilders may use this for more growth and more strength.[90,91]

GROWTH HORMONE AND EXERCISE

These hormones can affect the exercise. Concentration of growth hormones may help to increases the duration of exercise. For more intensive exercise body need more amount of hormones in this time growth hormones will be increased by 5-10 fold. For short duration of exercise growth hormones may lead to its peak point after 30 minutes.[92,93] Training may endurance the pulsatile and it may elevate the growth hormones amplitude. Other factors which are responsible are it may lead to increase in hypoglycaemia, temperature increases and it may be decreases the obesity, carbohydrate- rich diet.[94,95]

EFFECT OF hGH IN THE BODY

This are secreted from pituitary gland. These contains two hypothalamic peptides. By back regulations, growth hormones inhibit the hGH secretions. The secretion of hGH is higher in women with respect to men. During slow wave sleeping and during exercise hGH level are very much higher. Some drugs may increase their secretions like clonidine, L-dopa etc. it has both direct and indirect effects.[96,97]

THERAPEUTIC USE OF hGH

These may be used for both children and adulthood and also for girls which has turner syndromes. For relief from burning and thermal injuries, a high dose of growth hormones is used. Long term uses of growth hormones may increases the bone mass. These body compositions are due to anabolic, lipolytic properties of growth hormones.[98,99]

2. INSULIN

Insulins are secreted by beta cells of pancreatic islets. It is a peptide hormone. It is the main anabolic hormones in the body. It metabolized the carbohydrates, protein and fats by absorption of glucose form the blood into liver, fat and skeletal muscles. After absorption glucose is converted into glycogen by glycogenesis or triglycerides. High concentration of insulin may inhibit the production and secretion of glucose into the blood.[100,101] Synthesis of protein are also affected by insulin. If the insulin level is decreases it gives opposite effects and may reverse body fats. Beta cells secreted insulin into the blood in response to high level of glucose which inhibits secretion of insulin. By stimulating glycogenolysis and gluconeogenesis, glucagon increases blood glucose level.[102,103] In glucose homeostasis, insulin and glucagon are secreted into the blood in response to

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blood glucose concentration. Insulin may compose of 51 amnio acids and it will be linked with each other by disulfide bonds.[104,105]

EFFECT OF INSULIN ON BODY BUILDING

Misuse and inappropriate compliance are the correlation with chronic medical conditions and it may induce anxiety and depression disorders. Psychiatric disorder may be occurs in insulin dependent diabetes. It has higher co-morbid substance misuse.[106,107] Hypoglycemia is occurred in insulin depended diabetics. Mood changing, depressive and anxiety may occur in this diabetes. Misuse of insulin is related with suicide, parasuicide or factitious illness. Glucose metabolism may be increases in body builders. It may also helps in synthesis of protein and improve the performances. Insulin treated diabetes may help for lean body mass, regulated glucose metabolism, it helps to transport amino acids. Body builder may use this because it stimulates the lipogenesis and diminished lipolysis.[108,109]

3. TESTOSTERONE

Male sex hormones and a natural anabolic steroid. It may help to development of male reproductive tissues like testes and prostate. It may also promote the secondary sexual characteristics. It may also increase the muscle and bone mass and growth of body hair. It may also prevent them from osteoporosis.[110,111] It can take several steps from cholesterol and converted in the liver to inactive metabolites. Testosterone secreted from testicle of males. Testosterone level is very high in adult male as compare to adult female. It is also used as a medication in the treatment of low-level testosterone level in men and breast cancer in women.[112,113]

4. Androgenic-Anabolic Steroids Effects on Athletes

It is made up in synthetic process. It is also a male testosterone hormone. Testosterone may be produced from Leydig cells which are located in testes. It was believed that castration may loss some characteristics of certain secondary male sex by this a same potential of substances are made.[114,115] The active extraction is been available and production of synthetic androgens are taken places but androgenic and anabolic properties are not separated. androgenic properties are development of male characteristics, deepening of voices and a hair growth. It effects protein metabolisms and also inhibits the protein metabolism.[116,117] Some modifications are done in the AAS. The uses are limited. It may have some problems like endocrine dysfunctions of testes and hypothalamus-pituitary-gonadal axis. It also used to treat nitrogen balance, growth muscles and other non-endocrine diseases. It may also helps in male infertility treatment by administration of testosterone.[118,119] It may also used as medically a small amount of AAS may give the positive effects on nitrogen balance in polytrauma patients, in burn injuries and for HIV patients. This drug used in muscle dystrophy and also some dermatological diseases. These drugs are also used for body builders for better performances and muscle building. It gives bad effects on body builders and have lots of disadvantages. AAS is been abused by many body builders.[120,121,122]

1. Uses of Androgenic-Anabolic Steroids (AAS)

Due to AAS administrations the body weight increases about 10-15kg. it also helps to reduces the fat mass. In some studies, it was found that uses of AAS may reduce the fat. It is used for paediatric endocrinologists. It may also help in appetite stimulation and increases of muscle mass. It may also used in cancer and AIDS patients. In body builders it may helps in development and maintenance of secondary sexual characteristics[123,124].

ADVANTAGES OF BODY-BUILDING

There is several importance of body building. Some are-

1. Improve bodily health

Body building may help to improve the health. It may decrease the risk of coronary heart disease. training and aerobic exercises may reduce the chance of obesity and high cholesterol and control high blood pressures. It gives great impacts on muscle, bones and joints. It also helps to make muscles and body strong and flexible. Training and exercise may helps to free from many diseases like osteoporosis and arthritis.[125,126]

2. Improve mental health

Yoga, body building, training and aerobic exercise may boost mind and mental well-being. stress, anxiety and depression may be reduced by weight training and aerobic exercises. It can also help to rising in self-esteem and confidences. Bodybuilding may help to develop positive self-image. This can help in lose weight, feel body as a leaner, stronger and better. To deal with negative emotions bodybuilding, aerobic exercise and weight training is most important things. Bodybuilding or some physical activity helps to released endorphin. This helps to influences mood. It can also help to sleep better, reduces fatigue and psychological tension.[127,128]

3. Improve nutrition

Weight training, aerobic exercise, healthy nutrition and rest may improve health. Healthy eating food can make the body and mind function properly. Antioxidant food may improve focus and memory. Iron containing food may provide healthy brain and mind. Vitamin B is very much required for healthy mind. Water is most important. It can hydrate the body and brain and keeping detoxified and oxygenated.[129,130]

DISADVANTAGES OF BODY-BUILDING

1. Low Energy Availability

Energy intake by a body builder is more. They take high calorie diet in training time and low calories in competition time. Low calories give low energy availability. It has negative effects on bodybuilders.

2. Greater Injury Risk

During training and bodybuilding routine it makes gain some risk for injuries. During beginners, knee joints, hands and almost whole body is in pain. Some athletes may have chronic pain.[131,132]

3. Social Anxiety and Dysmorphia

Some bodybuilder experiences psychosocial disorders then athletes. Muscle dysmorphia is the condition. In this situation, people may obsess over the shape and size of their muscles. Bodybuilder engage for risk to meet their goal of getting leaner and bigger. This

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Volume: 6 | Issue: 8 | August 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 7.032 ||ISI Value: 1.188

behaviour can lead to intense feelings of social anxiety.[133,134]

REFERENCES

1. *Alkahtani S. (2014). Comparing fat oxidation in an exercise test with moderateintensity interval training. J Sports Sci Med. 13(1):51-8.*
2. *Alkahtani, S.A., Byrne, N.M., Hills, A.P. & King, N.A. (2014). Interval Training Intensity Affects Energy Intake Compensation in Obese Men. Int J Sport Nutr Exerc Metab. 2014 Mar 25.*
3. *Alves, J.M.V.M., Rebelo, A.N., Abrantes, C., and Sampaio, J. (2010). Short term effects of complex and contrast training in soccer players' vertical jump, sprint, and agility abilities. J Strength Cond Res;24(4): 936–941.*
4. *Comyns TM, Harrison AJ, Hennessy LK, Jensen RJ. (2006). The Optimal Complex Training Rest Interval for Athletes From Anaerobic Sports.*
5. *J Strength Cond. 20(3):471-476. Conroy, T.R. (1991). Plyometric Training and it's Effects on Speed, Strength and Power of Inter-Collegiate Athletes, Abstract, Microform Publication Bulletin,72.*
6. *Daniel, J., Jose, M., Gonzalez, R., & Fernando, N. (2009). Effects of complex vs noncomplex training programs on lower body maximum strength and power. Isokinetics and Exercise Science. 17-4. 233-241.*
7. *Dhayanithi, R. (1991). Comparative Analysis of Continuous Running, Interval Running and the Combined Effects on Cardio respiratory Endurance", Unpublished M.Phil., Dissertation, Pondicherry University, Pondicherry.*
8. *Eduardo, J.A. M. S., & Manuel, A. A. S.J., (2008). Effects of complex training on explosive strength in adolescent male basketball players. The Journal of Strength and Conditioning Research. 22(3):903-9.*
9. *Engel, F,A, & Sperlich, B. (2014). High Intensity Interval Training for Young Athletes. Wien Med Wochenschr. 2014 Apr 15.*
10. *Esformes, JI, Keenan, M, Moody, J, and Bampouras, TM. Effect of different types of conditioning contraction on upper body postactivation potentiation. J Strength Cond Res 25(X): 000-000, 2011.*
11. *Fagan, C.D. & P.K. Doyle Baker. (2000). The Effects of Maximum Strength and Power Training Combined with Plyometrics on Athletic Performance. Medicine and Science in Sports and Exercise, 32(5).*
12. *Faude, O., Schnittker, R., Schulte, Z. R, Muller, F. & Meyer, T. (2013). High intensity interval training vs. high-volume running training during preseason conditioning in high-level youth football: a cross-over trial. J Sports Sci. 2013;31(13):1441-50.*
13. *Faude, O., Steffen, A., Kellmann, M. & Meyer, T. (2014). The Effect of ShortTerm Interval Training During the Competitive Season on Physical Fitness and Signs of Fatigue: A Cross-Over Trial in High Level Youth Football Players. Int J Sports Physiol Perform. 2014 Mar 11.*
14. *Ferrari, B.D., Impellizzeri, F.M., Rampinini, E., Castagna, C., Bishop, D. & Wisloff, U. (2008). Sprint vs. Interval Training in Football. Int J Sports Med. 29(8):668-74.*
15. *French, D.H., Kraemer, W.J., Cooke, C.B. (2003). Changes in dynamic exercise performance following a sequence of preconditioning isometric muscle actions. Journal of Strength and Conditioning Research, 17(4), 678-685.*
16. *Gabbett, T.J., Whyte, D.G., Hartwig, T.B., Wescombe, H. Naughton, G.A. (2014). The Relationship Between Workloads, Physical Performance, Injury and Illness in Adolescent Male Football Players. Sports Med.2014 Apr 9.*
17. *Gillen, J.B. & Gibala, M.J. (2014). Is high-intensity interval training a timeefficient exercise strategy to improve health and fitness? Appl Physiol Nutr Metab. 39(3):409-12.*
18. *Goran, S., Zoran, M., Nebojsa, T. & Aleksandar, J. (2011). Correlation between Speed, Agility and Quickness (saq) in Elite Young Soccer Players. Acta Kinesiologica, 2: 36-41.*
19. *Ingebrigtsen, J., Dillern, T. & Shalfawi. (2011). Aerobic capacities and anthropometric characteristics of elite female soccer players. J Strength Cond Res 25(12): 3352–3357.*
20. *Jovanovic, M., Sporis, G., Omrcen, D. & Fiorentini, F. (2011). Effects of speed, agility, quickness training method on power performance in elite soccer players. J Strength Cond Res. 25(5):1285-92.*
21. *Keating, S.E., Machan, E.A., O'Connor, H.T., Gerofi, J.A., Sainsbury, A., Caterson, I.D. & Johnson, N.A. (2014). Continuous exercise but not high intensity interval training improves fat distribution in overweight adults. J Obes. 2014:834865.*
22. *Lesinski, M., Muehlbauer, T., Busch, D. & Granacher, U. (2014). Effects of Complex Training on Strength and Speed Performance in Athletes: A Systematic Review. Sportverletz Sportschaden. 2014 Mar 5.*
23. *Lloyd, R. & Deutsch, M. (2008). Effect of order of exercise on performance during a complex training session in rugby players. J Sports Sci. 26(10):1122.*
24. *Logan, G.R., Harris, N., Duncan, S. & Schofield, G. (2014). A Review of Adolescent High-Intensity Interval Training. Sports Med. 2014 Apr 18.*
25. *Loudovikos, D. L., Jacky, F., Ceorge, L. & Charilaos, T. (2013). The Acute Effect of Upper-Body Complex Training on Power Output of Martial Art Athletes as Measured by the Bench Press Throw Exercise. Journal of Human Kinetics. Volume 39, Issue 1, Pages 167–175.*
26. *Mahdiabadi, J., Gaeini, A.A., Kazemi, T. & Mahdiabadi, M.A. (2013). The effect of aerobic continuous and interval training on left ventricular*

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 8 | August 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 7.032 ||ISI Value: 1.188

structure and function in male non athletes. Biol Sport. 30(3):207-11.

27. *Markus, D. & Rhodri L. (2008). Effect of order of exercise on performance during a complex training session in rugby players. Journal of Sports Sciences 26(8): 803 – 809.*
28. *McBride., N.M. (2002). The Effect of Heavy-Vs. Light-load Jump Squats on the Development of Strength, Power, and Speed. Journal of Strength Conditioning Research, 16(1), 75-82.*
29. *McMillan, K., Helgerud, J., Macdonald, R. & Hoff, J. (2005). Physiological adaptations to soccer specific endurance training in professional youth soccer players. Br J Sports Med. 39(5):273-7.*
30. *Orendurff, M.S., Walker, J.D., Jovanovic, M., Tulchin, K.L., Levy, M. & Hoffmann, D.K. (2010). Intensity and duration of intermittent exercise and recovery during a soccer match. J Strength Cond Res 24(10): 2683-2692.*
31. *Perez-Gomez, J. (2008). Effects of Weight Lifting Training Combined With Plyometric Exercises on Physical Fitness, Body Composition, and Knee Extension Velocity During Kicking in Football. Applied Physiology and Nutrition Metabolism, 33:3.*
32. *Raja, Chidambara. S. (1992). Comparative Analysis of the Effects of Continuous and Interval Running on Cardio-respiratory Endurance, Unpublished M.Phil., Dissertation, Annamalai University. Robbins, D.W. (2005). Postactivation potentiation and its practical applicability: a brief review. J Strength Cond Res. 19(2):453-8.*
33. *Rubley, M.D., Haase, A.C., Holcomb, W.R., Girouard, T.J. & Tandy, R.D. (2011). The effect of plyometric training on power and kicking distance in female adolescent soccer players. J Strength Cond Res. 25(1):129-34.*
34. *Sale, D. (2004). Postactivation potentiation: role in performance. Br. J. Sports Med. 38:386-387. Sathiyanarayana, Reddy. (1993). Relative Effects of Plyometric and Weight Training Followed by Plyometric Training on Power, Speed, Stride Length and Stride Frequency.*
35. *Unpublished Doctoral Thesis, Annamalai University. Slettalokken, G. & Ronnestad, B.R. (2014). High intensity interval training every second week maintains VO2maxin soccer players during off- season. J Strength Cond Res. 2014 Feb 20.*
36. *Sundramoorthy, V. (1999). Effect of Isolated and Combined Weight and Plyometric Trainings on Selected Strength Parameters, Speed and Power", Unpublished Doctoral Thesis, Alagappa Universit).*
37. *Thomas, K., French, D. &d Hayes, P.R. (2009). The effect of two plyometric training techniques on muscular power and agility in youth soccer players. J Strength Cond Res.23(1):332-5.*
38. *Zoran, M., Goran, S., Nebojsa, T., Nic, J.& Kresimir, S. (2013). Effects of a 12 Week SAQ Training Programme on Agility with and without the Ball among Young Soccer Players. Journal of Sports Science and Medicine. 12, 97-103.*
39. *Barrow, M. H. & McGhee, R. (1979). A practical approach to measurement in biochemical education. Philadelphia: Lea and Febiger, Edition-3rd.*
40. *Baumeister, R. F. (Ed.) (1999). The self in social psychology. Philadelphia, PA: Psychology Press (Taylor & Francis).*
41. *Beim, G. (1977). Principles of Modern Soccer. U.S.A: Houghton Mifflin Company. Chakrabathi, Ghosh & Sahana. (1984). Human Physiology. India: The New Book Stall, Calcutta.*
42. *Clarke, H. H & David, H. C. (1986). Application of Measurement to Physical Education. (6th ed) Englewood Cliffs, New Jersey: Prentice Hall:P.52-103. Costill, David L. (1986). Basics of Sports physiology. Indianpolis, IN: Benchmark Press, Inc. Fox, Edward, L. (1984). Sports Physiology. Philadelphia: Saunders College Publishers.*
43. *Fox, Edward. L, Richard Bowers and Merle L. Foss. (1993). The Physiological Basis for Exercise and Sport (5th ed). Dubuque, Iowa: WCB Brown and Bench Mark Publishers.*
44. *Hardayal, Singh. (1991). Science of Sports Training. New Delhi, India: D.V.S. Publication, pp.13.*
45. *Kaka, T.S. & Biru, M. (1986). Improve Football Techniques. Patiala: NSNIS Publications.*
46. *Kamlesh, M. L. (2009). Ugc Net Digest Physical Education. New Delhi, India: Khel Sahitya Kendra, pp.608.*
47. *Loehr, J. E. (1986). Mental Toughness training for sports: Achieving Athletic excellence. Lexington, MA: Stephen Greene press.*
48. *Alkahtani S. (2014). Comparing fat oxidation in an exercise test with moderateintensity interval training. J Sports Sci Med. 13(1):51-8.*
49. *Alkahtani, S.A., Byrne, N.M., Hills, A.P. & King, N.A. (2014). Interval Training Intensity Affects Energy Intake Compensation in Obese Men. Int J Sport Nutr Exerc Metab. 2014 Mar 25.*
50. *Anuradha.K.N & Dr.R.Gandhi. (2015). Effect of Circuit Training on Selected Physical Fitness Variables among School Children of Karnataka State. International Journal of Recent Research and Applied Studies, 2, 5(7), 29 -31.*
51. *Arul. S. (2014). Effect of Aerobic Interval Training on Cardio Respiratory Endurance and Resting Pulse Rate among University Men Football Players. International Journal of Recent Research and Applied Studies, 2014, 1, 3(14), 55 - 57.*
52. *Benkins Dinesh S. & Glady Kirubakar S. (2014). Influence Prediction of Volleyball Playing Ability from Selected Physical and Physiological Variables of State Level Volleyball Players. International Journal of Recent Research and Applied Studies, 2014, 1, 5(10), 43 - 47.*
53. *Bharathiraja, S., Umamaheswari, M.& Palanisamy. A. (2015). Prediction of Batting Abilities from the Selected Kinanthropometric Physical and Physiological Variables Among Cricketers. International Journal of Recent Research and Applied Studies, 2015, 2, 7(5), 18 -21.*
54. *Bupesh S. Moorthy. (2014). Effect of Cross Training Program on Leg Strength and Leg Explosive Power among Football Players. International*

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 8 | August 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 7.032 ||ISI Value: 1.188

Journal of Recent Research and Applied Studies, 2014, 1, 5(5), 23 - 25.

55. *Dhanalakshmi, M. & Amsa Natarajan. (2014). Effect of Aerobics Training on Selected Motor Variables of High School Soccer Players. International Journal of Recent Research and Applied Studies, 2014, 1, 7(14), 56 - 58.*
56. *Engel, F,A, & Sperlich, B. (2014). High Intensity Interval Training for Young Athletes. Wien Med Wochenschr. 2014 Apr 15.*
57. *Faude, O., Steffen, A., Kellmann, M. & Meyer, T. (2014). The Effect of ShortTerm Interval Training During the Competitive Season on Physical Fitness and Signs of Fatigue: A Cross-Over Trial in High Level Youth Football Players. Int J Sports Physiol Perform. 2014 Mar 11.*
58. *Faude, O., Steffen, A., Kellmann, M. & Meyer, T. (2014). The Effect of ShortTerm Interval Training During the Competitive Season on Physical Fitness and Signs of Fatigue: A Cross-Over Trial in High Level Youth Football Players. Int J Sports Physiol Perform. 2014 Mar 11.*
59. *Ferrari, B.D., Impellizzeri, F.M., Rampinini, E., Castagna, C., Bishop, D. & Wisloff, U. (2008). Sprint vs. Interval Training in Football. Int J Sports Med. 29(8):668-74.*
60. *Gabbett, T.J., Whyte, D.G., Hartwig, T.B., Wescombe, H. Naughton, G.A. (2014). The Relationship Between Workloads, Physical Performance, Injury and Illness in Adolescent Male Football Players. Sports Med. 2014 Apr 9.*
61. *Gillen, J.B. & Gibala, M.J. (2014). Is high-intensity interval training a time-efficient exercise strategy to improve health and fitness? Appl Physiol Nutr Metab. 39(3):409-12.*
62. *Giridharan, K. & CH. VST. Saikumar. (2015). Effects of High Intensity Aerobic Interval Training Concurrent Low Intensity Aerobic and Resistance Interval Training on Physiological Variables of College Level Football Players. International Journal of Recent Research and Applied Studies, 2015, 2,3 (9), 35 -39.*
63. *Gobikrishnan, S. Rajendran, K. & K. Murugavel. (2014). Influence of Isotonic and Isometric Strength Training on Selected Physical Fitness Variables among College Football Players. International Journal of Recent Research and Applied Studies, 2014, 1, 3(17), 65 - 71.*
64. *Goran, S., Zoran, M., Nebojsa, T. & Aleksandar, J. (2011). Correlation between Speed, Agility and Quickness (saq) in Elite Young Soccer Players. Acta Kinesiologica, 2: 36-41.*
65. *Ingebrigtsen, J., Dillern, T. & Shalfawi. (2011). Aerobic capacities and anthropometric characteristics of elite female soccer players. J Strength Cond Res 25(12): 3352-3357.*
66. *Jayaraja. K. (2015). An Impact of Yoga Practices and Aerobic Dance on Shooting Performance among College Men Soccer Players. International Journal of Recent Research and Applied Studies, 2015, 2, 3 (11), 47 - 50.*
67. *Jovanovic, M., Sporis, G., Omrcen, D. & Fiorentini, F. (2011). Effects of speed, agility, quickness training method on power performance in elite soccer players. J Strength Cond Res. 25(5):1285-92.*
68. *Keating, S.E., Machan, E.A., O'Connor, H.T., Gerofi, J.A., Sainsbury, A., Caterson, I.D. & Johnson, N.A. (2014). Continuous exercise but not high intensity interval training improves fat distribution in overweight adults. J Obes. 2014:834865.*
69. *Lloyd, R. & Deutsch, M. (2008). Effect of order of exercise on performance during a complex training session in rugby players. J Sports Sci. 26(10):1122. Logan, G.R., Harris, N., Duncan, S. & Schofield, G. (2014). A Review of Adolescent High-Intensity Interval Training. Sports Med. 2014 Apr 18.*
70. *Loudovikos, D. L., Jacky, F., Ceorge, L. & Charilaos, T. (2013). The Acute Effect of Upper-Body Complex Training on Power Output of Martial Art Athletes as Measured by the Bench Press Throw Exercise. Journal of Human Kinetics. Volume 39, Issue 1, Pages 167-175.*
71. *Lucas SJ, Cotter JD, Brassard P, & Bailey DM (2015). High-intensity interval exercise and cerebrovascular health: curiosity, cause, and consequence. Journal of cerebral blood flow and metabolism: official journal of the International Society of Cerebral Blood Flow and Metabolism, 35 (6), 902-911.*
72. *Lucas SJ, Cotter JD, Brassard P. & Bailey DM. High-intensity interval exercise and cerebrovascular health: curiosity, cause, and consequence. J Cereb Blood Flow Metab. 35(6):902-11.*
73. *Mahdiabadi, J., Gaeini, A.A., Kazemi, T. & Mahdiabadi, M.A. (2013). The effect of aerobic continuous and interval training on left ventricular structure and function in male non athletes. Biol Sport. 30(3):207-11.*
74. *Manikandan, S. (2014). Impact of Moving Circuit Training on Muscular Strength and Leg Strength among Male Handball Players. International Journal of Recent Research and Applied Studies, 5 (25), 110-111.*
75. *Manikandan. S. (2014). Effect of Specific Soccer Training Programme on Selected BioMotor Abilities among Soccer Players. International Journal of Recent Research and Applied Studies, 2014, 1, 7(25), 103 - 104.*
76. *Manikandan. S. (2014). Influence of Progressive Anaerobic Training on Selected Physiological Variables of Football Players. International Journal of Recent Research and Applied Studies, 2014, 1, 6(23), 90 - 91.*
77. *Manoj Kumar.A. Effect of Futsal and Beach Football on Selected Game Skill Variables among Football Players. International Journal of Recent Research and Applied Studies, 2014, 2 (6), 24 -26. McMillan, K., Helgerud, J., Macdonald, R. & Hoff, J. (2005). Physiological adaptations to soccer specific endurance training in professional youth soccer players. Br J Sports Med. 39(5):273-7.*
78. *Orendurff, M.S., Walker, J.D., Jovanovic, M., Tulchin, K.L., Levy, M. & Hoffmann, D.K. (2010). Intensity and duration of intermittent exercise and recovery during a soccer match. J Strength Cond Res 24(10): 2683-2692.*

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 8 | August 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 7.032 ||ISI Value: 1.188

79. *Perez-Gomez, J. (2008). Effects of Weight Lifting Training Combined With Plyometric Exercises on Physical Fitness, Body Composition, and Knee Extension Velocity During Kicking in Football. Applied Physiology and Nutrition Metabolism, 33:3.*
80. *Prem Edwin A. & Ramesh. C. (2015). Correlations of Selected Physical Variables with Playing Ability among College Level Soccer Players. International Journal of Recent Research and Applied Studies, 2015, 2,3 (3), 9 -11.*
81. *Rajesh, K. (2012). A Study on the effect of Plyometric exercises for development of Speed among Foot Ball Players of Osmania University, Asian Journal of Physical Education and Computer Science in Sports. Volume.7 No.1 pp50-52.*
82. *Ramakrishnan, A. & Gopinath, R. (2014). Effects of Weight Training and Circuit Weight Training on Selected Strength and Physiological Variables. International Journal of Recent Research and Applied Studies, 1, 3(1), 1 - 4.*
83. *Ratheesh Babu. C. & Vallimurugan. (2014). Effect of Interval Training on Cardio Respiratory Endurance among Football Players. International Journal of Recent Research and Applied Studies, 1 (11), 40 - 42.*
84. *Rubley, M.D., Haase, A.C., Holcomb, W.R., Girouard, T.J. & Tandy, R.D. (2011). The effect of plyometric training on power and kicking distance in female adolescent soccer players. J Strength Cond Res. 25(1):129-34.*
85. *Santhosh, J. & Sivakumar. K. (2015). Prediction of Shooting Ability through Selected Physical Fitness Components among University Male Football Players. International Journal of Recent Research and Applied Studies, 2015, 2, 6(6), 25 -27.*
86. *Senthilkumar, J. & Gokulakrishnan. D. (2015). Effect of Aerobic Interval Training on Selected Physical Variables among College Level Football Players. International Journal of Recent Research and Applied Studies, 2015, 2, 2(7), 31 - 34.*
87. *Senthilkumar, P. & Annadurai. R.A. (2014). Study on Effects of Isolated and Combined SAQ and Strength Trainings on Selected Performance Variables of Intercollegiate Men Football Players. International Journal of Recent Research and Applied Studies, 2014, 1, 7(19), 74 - 77.*
88. *Senthilkumar, P. Annadurai. R.A (2014). Study on Effects of Isolated and Combined SAQ and Strength Trainings on Selected Physical Variables of Intercollegiate Men Football Players. International Journal of Recent Research and Applied Studies, 2014, 1, 7(17), 66 - 70.*
89. *Sethu. S. (2014). The Comparative Effect of Hill Training and Plyometric Training on Speed and Vertical Explosive Power among Football Players. International Journal Of Recent Research And Applied Studies, 2014, 5 (19), 86-90.*
90. *Sethu. S.A. (2014). Comparison of Endurance Training Responses to Hill and Sand among School Football Players. International Journal of Recent Research and Applied Studies, 1 (14), 52 - 58.*
91. *Sivakumar, M., Johnson, S. & Rajendran. K. (2014). Influence of Plyometric Training Circuit Training and Weight Training on Leg Strength Back Strength Anaerobic Power among Inter Collegiate Volleyball Players. International Journal of Recent Research and Applied Studies, 1, 3(11), 45 - 49.*
92. *Slettalokken, G. & Ronnestad, B.R. (2014). High intensity interval training every second week maintains VO2max in soccer players during off-season. J Strength Cond Res. 2014 Feb 20.*
93. *Sooriyanarayanan, M. & Sundar. K. (2014). Effects of Anaerobic and Aerobic Training on Overall Playing Ability Performance of Collegiate Football Players. International Journal of Recent Research and Applied Studies, 2014, 1, 6(5), 23 - 25.*
94. *Suresh Kumar, M. (2014). Influence of Circuit Training on Selected Physical Fitness Variables among Men Hockey Players. International Journal of Recent Research and Applied Studies, 1, 7(6), 16 - 19.*
95. *Suresh Kumar. G. (2015). Effects of Sports Loading Program on Speed Endurance Related Parameters in Football Players. International Journal of Recent Research and Applied Studies, 2015, 2, 2(2), 1 - 3.*
96. *Vaczi, M., Tollar, J., Meszler, B., Juhasz, I. & Karsai I. (2013). Short-term high intensity plyometric training program improves strength, power and agility in male soccer players. J Hum Kinet. 36:17-26.*
97. *Vaczi, M., Tollar, J., Meszler, B., Juhasz, I. & Karsai I. (2013). Short-term high intensity plyometric training program improves strength, power and agility in male soccer players. J Hum Kinet. 36:17-26.*
98. *Vallimurugan. V. & Vincent, P. J. (2013). Effect of SAQ Training on Selected Physical Fitness Parameters of Men Football Players. International Journal of Advanced and Innovative Research.1-2.*
99. *Venkatachalapathy, R. (2015). Effect of Circuit Training Programme on Speed and Agility. International Journal of Recent Research and Applied Studies, 2, 2(17), 71 - 72.*
100. *Venkatachalapathy. R. (2015). Effect of Target Shooting Practice on Accuracy in Goal Scoring Among Football Players. International Journal of Recent Research and Applied Studies, 2015, 2,4 (13), 52 - 54.*
101. *Vigneshwaran, G. Kalidasan, R. Srinivasaragavan S. (2014). Mapping of Soccer Research through Publications Output - A Study of*

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 8 | August 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 7.032 ||ISI Value: 1.188

Global Level during 2009-2013. International Journal of Recent Research and Applied Studies, 2014, 1, 7(12), 45 - 50.

102. *Zoran, M., Goran, S., Nebojsa, T., Nic, J.& Kresimir, S. (2013). Effects of a 12 Week SAQ Training Programme on Agility with and without the Ball among Young Soccer Players. Journal of Sports Science and Medicine. 12, 97-103.*
103. *Walberg-Rankin J. A review of nutritional practices and needs of bodybuilders. J Strength and Cond Res 1995;9:116-124.*
104. *Journal of the American Society of Echocardiography 2010;23:516-522.39. Rogol AD, Yesalis CE, 3rd. Clinical review 31: Anabolic-androgenic steroids and athletes: what are the issues? J Clin Endocrinol Metab 1992;74:465-9.*
105. *Kutscher EC, Lund BC, Perry PJ. Anabolic steroids: a review for the clinician. Sports Med 2002;32:285-96.*
106. *Spendlove, J.; Mitchell, L.; Gifford, J.; Hackett, D.; Slater, G.; Cobley, S.; O'Connor, H. Dietary intake of competitive bodybuilders. Sports Med. 2015, 45, 1041–1063.*
107. *. Kennedy, R.H. Encyclopedia of Bodybuilding: The Complete A–Z Book on Muscle Building; Robert Kennedy Publishing: Toronto, ON, Canada, 2008.*
108. *Slater, G.; Phillips, S.M. Nutrition guidelines for strength sports: Sprinting, weightlifting, throwing events, and bodybuilding. J. Sports Sci. 2011, 29 (Suppl. S1), S67–S77.*
109. *Giampreti, A.; Lonati, D.; Locatelli, C.; Rocchi, L.; Campailla, M.T. Acute neurotoxicity after yohimbine ingestion by a body builder. Clin. Toxicol. 2009, 47, 827–829.*
110. *Faber, M.; Benade, A.J. Nutrient intake and dietary supplementation in body-builders. S. Afr. Med. J. 1987, 72, 831–834.*
111. *Hackett, D.A.; Johnson, N.A.; Chow, C.M. Training practices and ergogenic aids used by male bodybuilders. J. Strength Cond. Res./Natl. Strength Cond. Assoc. 2013, 27, 1609–1617.*
112. *Schafer, C.N.; Guldager, H.; Jorgensen, H.L. Multi-organ dysfunction in bodybuilding possibly caused by prolonged hypercalcemia due to multi-substance abuse: Case report and review of literature. Int. J. Sports Med. 2011, 32, 60–65.*
113. *Andersen, R.E.; Barlett, S.J.; Morgan, G.D.; Brownell, K.D. Weight loss, psychological, and nutritional patterns in competitive male body builders. Int. J. Eat. Disord. 1995, 18, 49–57.*
114. *Brill, J.B.; Keane, M.W. Supplementation patterns of competitive male and female bodybuilders. Int. J. Sport Nutr. 1994, 4, 398–412.*
115. *Helms, E.R.; Aragon, A.A.; Fitschen, P.J. Evidence-based recommendations for natural bodybuilding contest preparation: Nutrition and supplementation. J. Int. Soc. Sports Nutr. 2014, 11.*
116. *Rossow, L.M.; Fukuda, D.H.; Fahs, C.A.; Loenneke, J.P.; Stout, J.R. Natural bodybuilding competition preparation and recovery: A 12-month case study. Int. J. Sports Physiol. Perform. 2013, 8, 582–592.*
117. *Bamman, M.M.; Hunter, G.R.; Newton, L.E.; Roney, R.K.; Khaled, M.A. Changes in body composition, diet, and strength of bodybuilders during the 12 weeks prior to competition. J. Sports Med. Phys. Fit. 1993, 33, 383–391.*
118. *Sandoval, W.M.; Heyward, V.H. Food selection patterns of bodybuilders. Int. J. Sport Nutr. 1991, 1, 61–68.*
119. *119. Walberg-Rankin, J.; Edmonds, C.E.; Gwazdauskas, F.C. Diet and weight changes of female bodybuilders before and after competition. Int. J. Sport Nutr. 1993, 3, 87–102.*
120. *Withers, R.T.; Noell, C.J.; Whittingham, N.O.; Chatterton, B.E.; Schultz, C.G.; Keeves, J.P. Body composition changes in elite male bodybuilders during preparation for competition. Aust. J. Sci. Med. Sport 1997, 29, 11–16.*
121. *Van der Ploeg, G.E.; Brooks, A.G.; Withers, R.T.; Dollman, J.; Leaney, F.; Chatterton, B.E. Body composition changes in female bodybuilders during preparation for competition. Eur. J. Clin. Nutr. 2001, 55, 268–277.*
122. *Lemon, P.W.; Tarnopolsky, M.A.; MacDougall, J.D.; Atkinson, S.A. Protein requirements and muscle mass/strength changes during intensive training in novice bodybuilders. J. Appl. Physiol. 1992, 73, 767–775.*
123. *Della Guardia, L.; Cavallaro, M.; Cena, H. The risks of self-made diets: The case of an amateur bodybuilder. J. Int. Soc. Sports Nutr. 2015, 12.*
124. *Robinson, S.L.; Lambeth-Mansell, A.; Gillibrand, G.; Smith-Ryan, A.; Bannock, L. A nutrition and conditioning intervention for natural bodybuilding contest preparation: Case study. J. Int. Soc. Sports Nutr. 2015, 12.*
125. *Kistler, B.M.; Fitschen, P.J.; Ranadive, S.M.; Fernhall, B.; Wilund, K.R. Case study: Natural bodybuilding contest preparation. Int. J. Sport Nutr. Exerc. Metab. 2014, 24, 694–700.*
126. *Mountjoy, M.; Sundgot-Borgen, J.; Burke, L.; Carter, S.; Constantini, N.; Lebrun, C.; Meyer, N.; Sherman, R.; Steffen, K.; Budgett, R.; et al. The IOC consensus statement: Beyond the female athlete triad—Relative Energy Deficiency in Sport (RED-S). Br. J. Sports Med. 2014, 48, 491–497.*
127. *De Souza, M.J.; Nattiv, A.; Joy, E.; Misra, M.; Williams, N.I.; Mallinson, R.J.; Gibbs, J.C.; Olmsted, M.; Goolsby, M.; Matheson, G. 2014 Female Athlete Triad Coalition Consensus Statement on Treatment and Return to Play of the Female Athlete Triad: 1st International Conference Held in San Francisco, California, May 2012 and 2nd International Conference Held in Indianapolis, Indiana, May 2013. Br. J. Sports Med. 2014, 48.*
128. *National Nutrient Database for Standard Reference, Release 28. United Stated Department of Agriculture. Available online: http://www.ars.usda.gov/ba/bhnrc/ndl (accessed on 30 Septmeber 2015).*
129. *Pescatello, L.S.; American College of Sports Medicine. Acsm's Guidelines for Exercise Testing and Prescription;Wolters Kluwer/Lippincott Williams & Wilkins Health: Philadelphia, PA, USA, 2014.*
130. *Jackson, A.S.; Pollock, M.L.; Ward, A. Generalized equations for predicting body density of women. Med. Sci. Sports Exerc. 1980, 12, 175–181.*
131. *Ainsworth, B.E.; Haskell, W.L.; Herrmann, S.D.; Meckes, N.; Bassett, D.R., Jr.; Tudor-Locke, C.; Greer, J.L.; Vezina, J.; Whitt-Glover, M.C.; Leon, A.S. 2011 compendium of physical activities: A second update of codes and met values. Med. Sci. Sports Exerc. 2011, 43, 1575–1581.*

ISSN (Online): 2455-3662
EPRA International Journal of Multidisciplinary Research (IJMR) - Peer Reviewed Journal
Volume: 6 | Issue: 8 | August 2020 || Journal DOI: 10.36713/epra2013 || SJIF Impact Factor: 7.032 ||ISI Value: 1.188

132. *Loucks, A.B.; Kiens, B.; Wright, H.H. Energy availability in athletes. J. Sports Sci. 2011, 29 (Suppl. S1), S7–S15.*
133. *Maclean, P.S.; Bergouignan, A.; Cornier, M.A.; Jackman, M.R. Biology's response to dieting: The impetus for weight regain. Am. J. Physiol. Regul. Integr. Comp. Physiol. 2011, 301, R581–R600.*
134. *Thomas, D.T.; Erdman, K.A.; Burke, L.M. Position of the academy of nutrition and dietetics, dietitians of canada, and the american college of sports medicine: Nutrition and athletic performance. J. Acad. Nutr. Diet.2016, 116, 501–528.*