

**ADDIS ABABA UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**

**THE EFFECT OF DIETARY AND FLUID INTAKE BEFORE, DURING  
AND AFTER TRAINING ON ATHLETICS PERFORMANCE. THE CASE  
OF HAGERSELAM JUNIOR ATHLETES TRAINING CENTER IN SNNPR**

**BY:**  
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**JUNE 2011**  
**ADDIS ABABA**

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## **Acronyms**

ANNPR	Southern Nation Nationalities Peoples Region
BMR	Basal Metabolic Rate
EAF	Ethiopian Athletics Federation
GI	Glycemic Index
IAAF	International Association of Athletics Federation
LASD	Long Slow Distance
LTAD	Long Term Athletic Development

## **Abstract**

*The major purpose of this study was to investigate the nutritional practices of Hagerselam junior athletics training center. Hagerselam is one of the athletics project found in SNNPR. It was established since, 2001 E.C. From established up to now, it provides continues training for junior athletes to produced talented athletes in both quality and quantity by maximizing their performance.*

*As indicated in several decades of scientific research has shown us that centering an athlete's food and fluid consumption on training or exercise (before, during and after can significantly support the demands of sport training. But many athletes follow nutritional practice that may prevent them reaching their goals of optimal performance. This is common problem that faced Ethiopian athletes including Hagerselam junior athletes. So the main purpose of this study is identifying, examining and recommending the general scientific and appropriate guidelines of dietary intake around training which helps to maximizing athletes peak performance.*

*For this study a descriptive survey method was employed. The tools used during data collection were: questionnaires, observation, interview and document analysis are included to achieve the study 22 athletes, 2 coaches,1 technical director and 4 food service providers purposively selected. The data analyzed using percentage and descriptive phrases. The results of the study reveal that the nutritional practices of Hageraselam athletics projects were found to below. Almost all athletes and coaches follow traditional nutrition practice before, during and after training, which enable them to achieve their goals. In addition to this factor they indentified problem were unsatisfactory meal plan, lack of awareness and less availability of food around the center.*

*To sum up, the findings of the study show that a lot has to be done to effective application of optimal nutritional practice in this athletic training center. Therefore, its recommended Hagerselam project athletes and coaches should be*

*applying scientific and suitable nutritional practices strategies to achieve their goals.*

## **CHAPTER ONE**

### **1. INTRODUCTION**

#### **1.1 Background of the study**

Athletics/ Track and field is one of the common and lovely sports that found in the Olympic games and many intentional games as well. It is not just one particular sport or game, but it is a collection of many kinds of sports (events). The events included in track and field's are among these sports that involve running, jumping, as well as throwing. Those three are the skills that are very much essential in winning a track and field.

The track and field events are easy to stage, which is one reason for the sport's worldwide popularity. The modern Olympic motto: *citius, Altius, Fortius* (faster, higher, stronger) best captures track and field competition. Each event determines who can run the fastest, who can jump the highest or the longest or who can throw farthest.

Through its collection of sports, athletics gives peoples an opportunity to achieve success. Because performance can be measured by stop watch or measure tape, athletes have personal or team (external) challenges to beat their own best time distance or height. So, to be successful achieve in athletics require great improvement in athletic performance. According to Majumdar, (2002) performance in many sports or event depends on the various factors proper program planning for training is the primary factor with the objective to improved performance by increasing the maximum energy output during a particular movements. He explained about diet as follows: diet significantly influences athletics performance. An adequate diet, in terms of quantity and quality, before, during and after training and competition will maximize performance. In Thompson (2009), mentioned that athletics eating, and

drinking patterns will influence how well they can train and whether they are able to at their best.

Moreover, timing nutrient ingestion is concept that has become increasingly popular in the world of sports performance. When the primary between training sessions is to recover nutrition becomes a key component that will allow the body to adapt to the imposed training demand, thus nutrition to support the recovery process and adaptation to training must start before training even begins.

The timing, type, and volume of carbohydrates, proteins and fats consumption throughout the day are critical for restoring overall muscles functions and homeostasis. Several decades of scientific research has shown us that centering an athletics' food and fluid consumption around training or exercise (before, during and after) can significantly help or support the dements of sport training. According to Maughan, & Burke, (2002) the goal of completion nutrition strategies is to combat factors that would otherwise cause fatigue or loss of performance during an event. Factors that can stop the athlete from performing optimally include depletion of glycogen stores in the active muscle, hypoglycemia (low level of blood glucose) and other mechanisms of "central fatigue" involving neurotransmitters, hyperthermia, dehydration hyponatremia (low levels of blood sodium), and gastrointestinal discomfort and upset. These factors vary according to the duration and intensity of the exercise, the environmental conditions, and athlete's individual characteristics including their nutritional and training status. Also, they were identified many factors contribute to loss of performance is unsound nutrition practice of most athletes around training and competition.

To facilitate and encourage the co-ordination, organization and development of track and field competition, the Ethiopian Athletics Federation (EAF) was established in 1949. Ethiopia for the first time participated in the Olympic games in 1956 in Australia, Melbourne begin represented by athletic and

cycling team. Starting from this up to the current competitions, Ethiopia, kept on shooting new athletes to the long distance to secure her place and reputation in the world area of track and field, by producing famous athletes like Haile Gebreselassie, Derartu Tulu, Tirunash Dibaba, Meseret Defar, Kennisa Bekele and others.

To respect and continue the top results in long distance and other events in the world, Ethiopian Athletics Federation must produce to replace elite athletes by youth and junior athletes for future by developing and implementing their mission and vision.

Solving the Federation's tangible problems and ensuring that its services are clear, just and productive: By

- Providing continuous training to athletes and professionals
- Producing talented athletes both in quality and quantity, so that they can produce, outstanding athletes to score good results in international competition.
- Ensure the continuity of top results by providing training to national team coaches' ad club coaches and construct sports facilities Ethiopian Athletics Federation (EAF) consists or embraces nine regional and two city administrative Federations, each of them work cooperatively and associatively to accomplish the mission and vision of Ethiopian Athletics Federation. There are many athletics projects in each region with their objectives to produce effective and successful athletes especially youth and junior athletes, that helps to replace and took senior/elite athletes in future to participate in national, continental and international level competition by representing their country.

The Hagerselam special junior athletic training center is one of the projects that found in SNNPR- and it established in 1996 E.C to produce talented and successful junior athletes. The site consist 28 junior athletes with aim of giving effective training to produce successful athletes in form. So, to achieve this

objective, there are so many contributing factors to enhance the performance of each athlete. For example, effective training programme and dietary intake have great influence on athletic performance. Because of this is burning issue, to produce successful athletes by overcoming nutrition related problems. So, researcher is entailed to conduct research in Hagerselam athletic projects to overcome this problem.

Furthermore, examining those influencing factor factors and bringing them into the light to search synthetic and most appropriate practical nutritional strategies around training or competition is most important to improve athletic performance.

So, this study attempted to survey the effects of dietary and fluid intake around training on athletic performance. The study also assessed the dietary strategies undertaken in the minute, hours or days prior, after and between sessions of training (competition) and its effect on athletic performance which helps to prepare the athlete to perform at his or her best in specific reference to Hagerselam junior athletes that found in Sidama zone in SNNPR. Finally, this study forwarded a few possible recommendations on nutrition practicing strategies to promote adequate intake of nutrients and fluids before, during and after training to meet their nutritional goals.

## **1.2 Statement of the Problem**

Any physical performance depends upon the supply of available nutrients for the working tissues. This supply is best achieved through a balance diet, i.e., having adequate quantities of calories vitamins, minerals, carbohydrate, fats, and proteins in proper proportions (Klafs, and Arnheim, 1981).

A varied, well- balanced diet in adequate amounts is all that is necessary from a nutritional point of view for the body to function optimally, and for providing biological basis for top performance (Astrand,&Rodah, 1977). Timing nutrient ingestion is concept that has become increasingly popular in the world of sport

performance. Now more than ever, athletes need accurate sports nutrition information. Optimal nutrition is an integral part of peak performance while an inadequate diet and lack of fuel (energy) can limit an athlete's potential for maximum performance.

Unfortunately, there is much misinformation available regarding a proper diet for athletes. Despite the apparent sophistication of knowledge available to guide athletes towards sensible food choices, the evidence from studies of dietary practices of sports people and from the observations of sports nutritionists is that many athletes follow nutrition practices (due to lack of practical nutrition knowledge and skill and misconceptions rather than expert advice) that may prevent them from reaching their goal of optimal performances (Maughan, & Burke 2002).

When discussing the dietary requirements of athletes, it's necessary to distinguish between events of very short duration and vents which last for a long period lasting up to several hours, which mainly influence the food and fluid consumption of individuals by increasing energy expenditure (Astrand & Rodahl, 1977).

So, the major purpose of the study is to assess timing in food and fluid intake before during and after training and its effects on athletic performance. This study greatly paid attention to examine Hagerslam junior athletes' practical experiences of dietary and fluid intake around training. Finally, this study tried to identity and recommends the scientific and appropriate way, type and volume of food and fluid intake before, during, and after training to enhance their performance. This is the most important to evaluate and modify of their current dietary intake to maximize their performance in given events.

### **1.3. Significance of the Study**

This paper can help to provide awareness to better training program, eating habits for athletes, before, during and after training for successful performance.

- This study suggest a way to eat food, drink fluid prior, during and post-training to achieve good performance or objective of training.
- Also this research can assist all athletes involved in training program in designing more effective eating strategies, which helps to improve their performance.

Finally, it may help (serve) as a base or as spring board for anyone who is interested to conduct further study in this area.

#### **1.4. Delimitation of the Study**

To conduct this research in all level of athletic projects and clubs that found in all regions of Ethiopia is the difficult task for researcher, because of numerous numbers of athletic projects and clubs through-out the country which seems to be time consuming. It requires more than 1 year gathering information. Therefore, the scope of the study confined to covers only SNNPR athletic projects to assess the effects of having nutrition before, during and after training on their performance. Moreover, the study also delimits itself and concentrate on SNNPR athletic projects, especially Hagerselam junior athletics training center.

This study delimits itself and concentrated dietary and fluid intake of carbohydrate protein fat and water, micro nutrients around training in time perspective. It is not include assessment of body composition, weight controlling and any additional supplements, nutritional ergogenic aids were not included in this study.

#### **1.5. Research Questions**

This study paid great attention to major issue, which have relevance with topic investigation and tried to answer the following basic research questions:

- Do timing, type, and volume of dietary and fluid intake around training or competition affect athletic performance?

- What are the factors contribute to the unsound nutrition practice of athletics around training?
- What are the correct and suitable scientific ways or strategies of time, type and volume of dietary intake before, during and after training?
- Does a Hagerselam junior athlete follow the effective way of nutrition strategies before, during and after training compare to the secondary data (scientific basis)?
- What effects do have with limitation of taking nutrition and fluid around training on athletic performance?
- Does athlete's food and fluid consumption around training (before, during, and after) can significantly help the demand of athletes in of endurance training?
- What should be done to minimize problems in nutrition practice around training to improve athletic performance

## **1.6. Objectives of the Study**

The general objective of the study is to determine the effect of timing of food and fluid intake around training on performance of athletes. Also, this study has more specific objectives:

1. To examine the influence of timing, type and amount of diet and fluid intake before, during and after on athletic performance.
2. To determine dietary and fluid intake before, during and after training or competition in Hageraselam junior project athletes.
3. To assess timing in dietary and fluid intake during training or competition and its effect on athletic performance.
4. To determine and apply a suitable way to measure success based on such objectives.
5. To compare the findings with secondary data (Scientific base) and to allow more detail evaluation of dietary and fluid intake of Hagerselam junior athletes.

6. Finally, to recommend the finding to responsible bodies to improve their nutritional practical strategies of Hagerselam junior athletes to enhance their performance.

### **1.7. Limitation of the Study**

A major limitation of the study is that, it's difficult to generalize findings to all projects and clubs athletes in Ethiopia. Making recommendations for changes of having nutrition plan in training and its effect on athletic performance may be difficult to this reason. There are a lot of constraints that a researcher encountered among this the majors are: unavailability of research work in the area, financial constraint, shortage of time, the weather condition and geographical location of the area (high altitude), transportation problems in traveling and lack scientific tools of measurement such as weight Kg.

### **1.8 Definition of the Terms**

- **Athletics** –is the sport that consists track and field events like running, jumping and throwing.
- **Nutrition**- is all the food a person eats and drinks.
- **Diet**- like the word 'nutrition' means all the food a person eats and drinks.
- **Calories**- The energy value of food; the unit used to measure energy that the body gets from food.
- **Nutrients**- Essential components of food needed by body.
- **Carbohydrate**- A primary food stuff used for energy.
- **Training**- is a systematic process with the objective of improving an athlete's fitness and performance in a selected activity.
- **Training programme**- is the plan athletes exercise or practice to develop their qualities required for an event.
- **Intake**- having the food and fluid/eating the solid food and drinking fluid.

- **Performance**- is the ability of execution of skill in specific time and specific situation.
- **Ingestion**- the act of taking substances such as food into the body.
- **Around training**- before, during, and after training.
- **Balanced diet**- diets that contain proper energy nutrient balance.
- **Optimum**- most effective, most desirable.
- **Exercise** - planned, structured, and repetitive body movement done to improve or maintain one or more components of physical fitness. Exercise is sub-categories of physical activities.

## **1.9 Organization of the Study**

This study consists five chapters. The first chapter deals with the problem and its approach, it include introduction, background of the study, statement of the problem, significance of the study, objectives of the study, basic research questions, delimitation of the study, limitation of the study, definition of the terms, and organization of the study. The second chapter consists, the review of related literature. The third chapter comprises of research design, methods, procedures and data source of the study. The fourth chapter involves presentation, interpretation and analysis of data. The last (fifth) chapter presents summary, conclusion and recommendation of the study.

## **CHAPTER TWO**

### **2. REVIEW OF RELATED LITERATURE**

#### **2.1 History of Athletics in the World**

Athletics (track and field) as a form of competitive activity is a multiples sport which embraces several separate events based on natural movements. These separate evens are quite different from one another in their method of execution and in the physical characteristics of the participants. Every event in track and field falls under one of two categories: track or field.

The track events involves sprinting (100m, 200m 400m, 110 hurdles, 100m hurdles 400m hurdles and 4x100m and 4x400m relay), middle distance; such as 800 m and 1,500m and long distance above 3000m. There are also four jumping events in field, including the long jump, triple jump, high jump and pole vault (Abera Dessalegne, 2008 unpublished material).

Athletics was especially popular, and soon became control to the exercise components of national education systems. Organized athletics thrived in well developed industrial societies and an ever expanding competition programme developed in the schools and universities, in military organizations and private clubs.

The international association of Athletic federation was founded in 1912 by 17 national Athletic Federations, who saw the need for a governing authority, for an athletic programme, for standardized technical equipment and world records with regard to administration, the number of the affiliated federations grew dramatically, from 17 in 1912 in 2006. All federations are invited to attend the IAAF congress every two years with elections held during even number congresses.

## **2.2 The Roles of the International Association of Athletics Federation**

It establishes the rules of the athletic sport; approves and maintains records; conducts a world athletics series of major athletics competitions. It is the supervising body for the technical running of athletics at the Olympic games.

The IAAF also has the task of development, where the primary goal is to see that all IAAF member Federations are able to create conditions under which their athletes fulfill their potential in competition, and derive maximum benefit from the sport.

## **2.3 Athletics in Ethiopia**

Although the exact roots of Ethiopian Athletics cannot be retraced accurately, it is widely believed that the sport was widely practiced in schools and military before 1897. But in organized form of sport activities were initially introduced in Ethiopian in 1920s. It is started for the purpose of physical education in few secondary schools. (Menelik II and Entoto comprehensives. Track and field was one of the major sporting activities performed by students.

The armed forces have also organized their own track and field competitions, which stimulated many soldiers to compete in athletics. The most famous examples are Abebe Bikila, a double Olympic Marathon champion Rome in 1960, and Tokyo in 1964, and Mamo Wolde who won the strenuous marathon with sensational case plus silver medal in 10,000 m in Mexico Olympic in 1968.

Great contributors for its development like major on Nskannen and the great runners of all time, like Abebe Bikila and Mamo Wolde have special place in the athletic history of Ethiopia. So, the whole world has accepted the unique talent of Ethiopians on long distance running to the extent, that the event long distance and Ethiopia are inseparable.

To facilitate and encourage the co-ordination, organization and development of track and field competition, the Ethiopian Athletics Federation (EAF) was established in 1949. Ethiopia for the first time participated in the Olympic games in 1956 in Australia, Melbourne begin represented by athletic and cycling team. Starting from this up to the current competitions, Ethiopia, kept on shooting new athletes to the long distance to secure her place and reputation in the world area of track and field, by producing famous athletes like Haile Gebreselassie, Derartu Tulu, Tirunash Dibaba, Masert Defar, Kennisa Bekele and others.

To respect and continue the top results in long distance and other events in the world, Ethiopian Athletics Federation must produce to replace elite athletes by youth and junior athletes for future by developing and implementing their mission and vision.

Solving the Federation's tangible problems and ensuring that its services are clear, just and productive: By

- Providing continuous training to athletes and professionals
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competition by representing their country (Abera Dessalegne, 2008 unpublished material).

## **2.4. DEVELOPING THE ATHLETE**

Athletics is recognized as being a late specialization sport. This is because most athletes achieve their best performance general between 24 to 34 years of age. Taking a long term approach to athlete development and training benefits all athletes, whatever their age or level of competition.

### **2.4.1. Athlete Development-the Long Term Approach**

The main concept of athlete development involves taking a long term approach to athlete development and training. This long term approach is designed to help individuals of all ages and abilities to optimize their development and reach their potential (Thompson 2009).

In its simplest form, an athletes` development was related to the structure and nature of training at any time to where an individual athlete is on their developmental pathway. This means, that individuals are: “doing the right things at the right time” for their long term, not necessarily immediate development (ibid).

Long term athlete development approach is an organized approach toward achieving the optimal training, competition and recovery throughout an athlete’s career. It recognizes that any individual, who has just commenced athletics, has different needs from and capabilities for training than someone who has been doing for longer. This is true no matter what age an athlete starts being involved what age an athlete starts being involved in athletics and emphasizes the importance of coaches knowing the training age, as well as the developmental age of each athlete they coach (ibid).

#### **2.4.1.1 Stages of Athlete Development**

Thompson (2009), tried to explain stages of athletes development in official IAAF guide to coaching as follows: Providing a uniform athlete development pathway within a “late specialization” sport like athletics, means that we can recognize a five stage athlete development model. The five stage model is progressive in nature which guides athletes form:

- 1<sup>st</sup>. Kinds athletics stage
- 2<sup>nd</sup> .The multi-events
- 3<sup>rd</sup>. The event group development
- 4<sup>th</sup>. Specialization stage
- 5<sup>th</sup>. Performance stage

As Thompson (2009) stated, “specialization” stage comes as a fine-tuning of the engine. By giving emphasis on physical conditioning, maintaining high volume training with increasing intensity at appropriate times of the year. The athlete now will tend to focus on an event or a small number of events. Individual strengths and weaknesses are now more clearly identified and action can be taken to improve these. There is gradual shift towards performing techniques and tactics in a variety of competitive conditions during training which increasingly model competitive environments. So, the coach will focus on optimizing preparation both physically and mentally.

So, for the successful of athlete development stage, there are so many ingredients in developing top performed athletes in last two stages of athletes development models.

## **2.5. The Ingredients of Success in Developing Top Level Athletes**

Lausanne (2001) explained the essential requirements of a top level training program to develop high quality athletes.

### **2.5.1 Coaching**

The quality of coaching and the athlete- coach relationship are the essential feature developing athletes.

- The quality of coaching determines the quality of the training environment. Athletes will not develop far without quality coaches creating and directing an intelligent training plan.
- The commitment of the coach to top achievement or realistic goals sets the tone of training etc.

### **2.5.2 Athletes**

Having special talent, strong motivation, and a willingness to work extremely hard, is all characteristics of the successful athlete.

### **2.5.3 Facilities and Equipment**

Frequently, the lack of facilities and equipment is a limiting factor to sport development. Unless this problem is resolved, it will be difficult to develop athletes to the highest levels.

However, many Olympic athletes have been successful despite sub-standard training facilities and equipment, because of their high motivation and commitment to hard work. So, sometimes overcoming difficult training conditions strengthens the athlete's resolve and provides an advantage to him/her during tough competition. But, it is important for sports administrators to try to improve training facilities and to create a positive environment which encourages proper training.

### **2.5.4 Athlete Support**

Lausanne (2001), explained about the importance of athlete support as follow. "If an athlete wishes to achieve reasonably high goals, an adequate support system must be created to provide that opportunity. The financial and administrative support plays great role in order to develop a well organized training and competition program."

Good coaching and adequate facilities mentioned the following requirements in development to top level athletes.

- Enough time away from school or work to train-top level athletes may have to spend more than three hours a day in serious training, seven days in a week.
- Adequate rest and diet.
- Continual stimulation and encouragement which creates a positive training environment.

### **2.5.5 Competition Opportunity**

Competition, at the right level and frequency, is essential for the development of athletes. Competition provides a focal point for training, and an important motivation for daily training.

## **2.6. Training for Performance**

Performance in any sports or event depends on the various factors. According to Majumdar (2002), proper planning for training is the primary factor and objective for sports training is to improve performance by increasing the maximum energy output during a particular movement.

Thompson (2009) defined training as follows: “Training is a systematic process with the objective of improving an athlete’s fitness in a selected activity. It is a long term process that is progressive and recognizes the individual/athlete’s needs and capabilities. The training programmes use practice to develop the qualities required for an event.

In another way Klafs and Arnheim (1981), were defined training as follows: “Training is a usually defined as a systematic process of repetitive, progressive exercise or work involving the learning process and acclimatization.”

### **2.6.1. Principle of Athletic Training**

The process of training must be planned, because training follows certain principles. Corbin, Lindsey and Welk (2000), identified the following principles of training.

## **Principles of Overload**

According to the principle of progressive over load, training must involve working the body (muscle and cardiovascular system harder than normal as the body adapts, training progresses to higher work level. (ibid)

As Klafs, and Arnheim (1981), were discussed about training load (the amount of exercise) or work performed may increased in two ways:

1. The weight of the load with which the individual performs exercises may be progressively increased.
2. The total time in which an exercise is performed may be decreased.

So, increasing the strenuousness of exercise in the ways suggested is an application of the overload principle, which, in essence holds that an activity must always be upgraded to a consistently higher level through maximal or near-maximal stimulation. In this way the metabolic level and the organic responses can be increased.

## **Principle of Reversibility**

If the athlete is not exposed to regular training there is no loading and the body has no need to adapt, so the fitness level of an individual returns slowly to the original level. According to the principle of disuse, training benefit is lost if training is either discontinued or reduced too abruptly. To avoid this, all training programs must include maintenance program (Majumda (2002).

## **Principle of Specifically**

The training load must be specific to both to the individual athlete and to the demands of their chosen event. According to the principle of specificity, to maximize the benefits, training must be specifically matched to the type of activity the person normally engages in (ibid).

## **Principles of Individualization**

According to the principle of individuality each person must be recognized as unique and such individual variation must be allowed for designing training programs. Different people will response to a given training program in a different ways (ibid).

Additionally, Thompson (2009), stated the principle of individualization as follows: each individual is unique and each brings to athletics his/her own capabilities, capacities and responses to training. The training age, developmental age and heredity may have contribution to individual difference.

### **2.7. Training Methods/Methods of Training**

There is a numerous number of training methods that different coaches uses to provide effective and valuable training to their athletes. Numerous training methods have been developed by different scholars`. But the researcher only intends to outline on a few and most common methods of training.

#### **2.7.1. Continuous Training**

Continuous training involves jogging or running continuously at a steady pace (Honeybourane et al. 1996). High intensity continues training is performed at high intensities (85-95% of HR max) and is very effective for endurance training without requiring highly stressful and uncomfortable work levels. Long slow distance (LSD) training used relatively low intensity work (60% to 80% of HR max) performed for a very long distance or duration which places less stress on the cardiovascular and respiratory.

Continuous training involves four consideration (Arnheim and prentice, 2000).

- Mode or type of activity
- Frequency of the activity
- Duration of the activity
- Intercity of the activity

**Mode:** The type of activity used in continues training must be aerobic. Aerobic activities are those that elevate the heart rate and maintain it at that level for an extended time. Aerobic activities generally involve repetitive, whole –body large muscle movements performed over an extended period of time. Examples of a aerobic activities are: running jogging, walking, cycling, swimming, rope skipping, stair climbing and cross- country skiing.

**Frequency:** To see at least minimal improvement in cardio respiratory endurance it is necessary for the average persons to engage in no less than three sessions per week. A competitive athlete should be prepared to train as often as six times per week (Arnheim & Prentice, 2000).

**Duration:** The competitive athlete should train for at least 45 minutes with the heart elevated to training levels and training at a constant near competition pace that enhances a runner’s ability to maintain an even pace during race and typically results in the best race times (Majumdar, 2002).

In addition, Arnheim and Prentice (2000) states, “the greater the duration of the workout, the greater improvement in cardio respiratory endurance.”

**Intensity:** From the four factors being considered above, the most critical factor is the intensity of training, even though a recommendation regarding training intensities varies (Arnheim and Prentice, 2000). Intensity is a critical factor in improving performance adaptations and specific to the speed and duration of training bouts (Majumdar, 2002).

### **2.7.2. Interval Training**

Interval training is a form of training in which periods of work are interspersed with periods of recovery (Honeybourne et al. 1996). Also Arnheim and Prentice (2000) were discussed interval training as follows “Interval training consists of alternating periods of relatively intense work and active recovery. It allows for performance of much more work at a more instance work at a more instance work- load over a longer period of time than does working continuously.”

Majumdar (2002), explained training can be used in almost any sport activity but most often used in track, cross country. Fox and Mathews, (1974) in Majumdar (2000), have identified the major variables that must be individually adjusted for each athlete:

- Rate and distance of the work interval (load and duration of resistance training).
- Number of repetition and sets during each training session.
- Duration of the rest interval (Recovery).
- Type of activity during the rest interval.
- Frequency of training per week.

The advantage of interval training is that, it allows work at 80% or higher level for a short period of time followed by an active period of recovery. There is a training- recovery ratio which indicates a time ratio for training versus recover. If the intensity of training is high then there is a greater recovery time and if the exercise is less intense there is short period of recovery.

### **2.7.3. Fartlek Training**

Fartlek means “speed play” in Swedish and the idea of this activity is that, the athlete varies the pace of the run and also the terrain they run over. A typical run will include some steady state running interspersed with sprints and slow recovery work and should include uphill and downhill work. Farthek involves the athlete working aerobically and an aerobically and it is a much more demanding form of training. Fratlek training has its own contribution to trainer. Fartlek training helps to improve an athlete’s  $Vo_2$  (max) and recovery process (Honeybourne, et al, 1996).

Majumdar (2002), to improve cardio respiratory endurance, fartlek training must elevate the heart rate to at least minimal training levels. Runners normally performed 45 minutes or longer. So, many coaches have used Fartlek training because it provides variety.

#### **2.7.4. Circuit Training**

Circuiting training is one method of training that coach and athletes apply some times in training. According to Arnheim and Prentice (2000), define circuit training as follows: circuit training employs a series of exercise stations that consists various combinations of weight training, flexibility, calisthenics, and brief aerobic exercises. More specifically circuit training is the way one moves rapidly from one station to the next and performs whatever exercise is to be done at that situation within a specified time period. It is important to order the exercises to alternate the muscles being used and allow for recovery. A typical circuit would consist of eight to twelve stations, and the entire circuit would be repeated three times or more.

Majumdar (2002), most circuit training allows modest increases in aerobic endurance and major increase in strength, muscular endurance and flexibility. So, cardiovascular conditions can be enhanced by increasing the speed through the circuit and by placing stations far the apart.

#### **2.8 Training of Physiological Energy System**

As to Astrand and Rodahl (1977) explained, physical training as follows: “physical training entails exposing the organism to a training load or work stress of sufficient intensity, duration, and frequency to produce a noticeable or measurable training effect, i.e. an improvement of the functions for which one is training. In order to achieve such a training effect, it is necessary to expose the organism to an overload, that is, to a stress which is greater than the one regularly encountered during everyday life.

Generally speaking, it appears that exposure to the training stress is associated with some catabolic processes, such as molecular breakdown of stored fuel and other cellular components, followed by an over shoot or anabolic response that causes on increased deposition of the molecules which were mobilized or broken down during exposure to the training load. In connections to training methods, the coaches and athletes’ have to give their attention towards the nutrients that is very essential to upgrade their performance (ibid).

## **2.9. Nutrition and Athletic Performance**

According to Burke (1998) “A vital, and often neglected, ingredient to a successful, training programme is a regulated diet”. In light of this, Majumdar (2002), diet significantly influences athletic performance. An adequate diet, in terms of quantity and quality, before, during and after training and competition will maximize performance.

It is obvious that the human body must be supplied continuously with energy to perform its many complex functions.

Any physical performance depends up on the supply of available nutrients for the working tissues (Klafs, & Arnheim, 1981). They explained supply of nutrients as follows: “The supply of available nutrients is best achieved through a balanced diet, i.e., having adequate quantities of calories, vitamins, minerals, carbohydrates, fats and proteins in proper proportions.”

As an athlete’s training and competition level increases, the body’s energy demands also increase. According to Thompson (2009), “A person should eat and drink the number of calories to supply the energy required by the body”. The average person has basic energy requirements to maintain the body through normal daily activities. The athlete has these basic energy requirements plus the energy needed to train and compete. As to Thompson, a typical growing adolescent might need about 2500 calories of energy per day for basic energy requirements. He may need an additional 500 calories for a training session.

So, a young athlete’s daily energy needs can be 3000 (2500+500) calories, or more.

Therefore, what an athlete`s eats or drinks affects directly or indirectly his/her performance. Thompson (2009) explained that “Diet directly affects the performance and health of each athlete’s. So, coach should be aware that athletes” eating and drinking patterns will influence how well they can train and whether they are able to compete at their best. Furthermore,

(Rodrigaz, Dimarco and Langley 2009) strengthens the idea of nutritional influence of athlete performance by saying: “There is no doubt that what an athlete eats and drinks can affect health, body weight and composition, substrate availability during exercise, recovery time after exercise and ultimately exercise performance.”

Over the past 20 years, research has clearly documented the beneficial effects of nutrition on exercise performance. Thompson (2009) tried to identify many benefits of a well chosen diet offers to all athletes, regardless of events, gender age or level of competition. He mentioned the following benefits:

- Optimal gains from the training programme.
- Enhanced recovery within and between training sessions and competitions.
- Achievement and maintenance of an optimal body weight and physique.
- A reduced risk of injury and illness.
- Confidence in being well-prepared for competition.
- Enjoyment of food and social eating situations.

Obviously, peak training nutrition doesn't just happen by chance. So, coaches should work with athletes to develop health diets where they are individually aware of their personal nutritional goals and of how they can select the nutrition to meet these goals.

Here below the researcher tried to look and discuss the way that food can play a very important part in successful training and competition. There were many scholars or scientists attempt to look why the body needs food which sorts of food are good for athletes, which are unnecessary and which are not so good and why? In light to, the types of food and time availability to training and type of training. Here first researcher tried to start by defining different terms: Like food, nutrition etc.

### **2.9.1. The Energy Balance**

It is obvious that the human body needs a constant supply of energy in order to perform everyday tasks such as respiration and digestion. The amount of calories a person needs depends on how big and active they are and how efficiently their body uses food. According to Honeybourne et al. (1996) “when athletes start to exercise the rate at which their body uses energy increases and the efficiency of the energy supply is one of the major factors determining athletic performance.

Production of energy for physical activity has to be able to cope with extreme situation- for example, during a 100m sprint large amounts of energy are needed vary quickly but during a marathon the energy must be made available over a prolonged periods of time (Honeybourne et al. 1996).

In another way, some people are physiologically better suited to certain activities than others, because their bodies are more efficient at releasing energy in a particular way. In light of this idea Thompson (2009), discusses the physiological efficient in releasing energy as follows:

“People have deterrent metabolic rates, but ever one’s metabolic rate can be increase during exercise”. Because of this reason, some people use up food for energy more quickly than others. The rate at which a person converts food to energy is known as the metabolic rate.

In addition to the above idea, Burke (1998) identified the major factors that make up athlete’s total energy requirements. These are:

- Basal metabolic rate (BMR) - the energy required just to keep their body functioning. Metabolic rate varies with age i.e. (decreasing as they get older), with body mass (increasing with a larger body mass), with body composition (increasing with greater muscles mass and decreasing fat stores), and gender (greater in men than women).

- Growth, children and adolescents may need plenty of additional kilojoules to provide for new bone and body tissues as they grow. Similarly to this, Thompson (2009) stated that, “Growing uses up a lot of energy and young athletes will find it hard to train and compete if their diet lacks energy”. Moreover, he stated in others words, “Athletes probably need more basic energy between the ages of 12 and 17 than at any other time in their lives.”
- In case of muscular work, many athletes perform heavy manual labour, for the most part. It is exercise particularly in the training schedule, which adds a significant contribution to total energy needs (Burke, 1998).

Energy expenditure for different types of exercise is dependent on the duration, frequency, and intensity of training, the sex of the athlete and prior nutritional status (Roderigez, et al, 2009). The more energy used in activity, the more calories needed to achieve energy balance.

In depth Majumdar (2002) stated that, “Total energy intake must be raised to meet the increased energy expended during training and maintenance of energy balance can be assessed by monitoring body weight, body composition and food intake.”

Therefore, the energy balance is important for successful training and competition. As a result, coaches and athletes must give attention to nutritional practice around training.

Inadequate energy intake relatively to energy expenditure compromises performance and negates the benefits of training and the performance of an athlete who does not take in sufficient calories will be reduced. When the calories supply is constantly low, the athlete will lose weight, because they start to use reserved fat as source of energy. The loss of lean tissue mass results, in the loss of strength and endurance as well as compromised immune

endocrines and musculoskeletal function (Thompson 2009). Also, Maughan (2000), “The major nutritional concern for athletes is the excess energy expended during strenuous training, which, if not matched by increased energy consumption, will inevitably result in a reducing training capacity and a drop in performance”.

In supporting the above idea, the largest energy requirements are reported by athletes who are young, growing, large, with plenty of muscle mass, and who under take length and high intensive training sessions each day. Therefore, the energy balance plays a great role for successful training and competition.

### **2.9.2 Nutrients**

Optimal physical performance requires a careful dietary balance of the essential nutrients. Different author`s identify the types of nutrients in different ways based on their importance or functions in human body, complex mixture of chemicals and on daily requirements in volume.

According to Wilmore & Costill (1999), they identified six types of nutrients based on their functions. These are:

- Carbohydrate
- Fate (lipid)
- Protein
- Vitamins
- Minerals
- Water

Furthermore, Burker (1998), discussed in detail about food/nutrients as follows; “Food is a complex mixture of hundreds of chemicals”. What is more each food is greater than the sum of its chemical composition, because once inside the body, the chemicals in a food interact with each other and with the chemicals in other foods eaten at the same times. He classified food as follows: Based on complete mixture of chemicals.

1. Nutrients:

- Carbohydrate, Protein, Fat, Water, Fibres, Vitamins, Minerals and trace elements

2. Flavors: natural and added

3. Colors: natural and added

4. Additives: e.g. presentation emulsifiers

5. Naturally occurring drugs e.g. caffeine

6. Naturally occurring poisons e.g. cyanide

7. Contaminants: e.g. pesticides

Burke and Gastelu (1999), tried to classify nutrients into two broad categories based on their volumes of daily consumption. These are:

- **Macronutrients:-** nutrients required daily in large amounts and that are thought of in quantities of ounces and grams. E.g. carbohydrates, protein, fats and water.
- **Micronutrients:-** nutrients that present in the diet and the body requires in small amounts.

E.g. vitamins and minerals

Of the various nutrients in the food we eat, it is only the carbohydrates, fat and proteins that can yield energy for muscular work (Astrand & Rodahl 1977).

According to Majumdar, (2002)., in the optimum diet for most sports, carbohydrate (CHO) is likely to contribute about 60-70% of total energy intake and protein about 12% with the remainder coming from fat.

Also, Honeybourne et al (1996) proposed that a balance diet contains:

- 55% carbohydrate
- 30% fat
- 15% protein

Similarly Wilmore & Costill (1999), explained about proportion of caloric consumption as follows of the total calories consumed, the recommended balance for most people is:

- Carbohydrate 55% to 60%
- Fat: no more than 30% (less than 10% saturated, and
- Protein: 10% to 15%

These three sources, however, do not contribute equally to the energy -yielding process in the muscle cell because of there are many factors that limits the utilization of each of them at the same level.

The fuel burned during exercise depends on the intensity and duration of the exercise, the athlete's sex, and prior nutritional status. All other conditions being equal, an increase in the intensity of an exercise will increase the contribution of carbohydrate to the energy pool. As the exercise continues the source of his carbohydrate may shift from the muscles glycogen pool to circulating blood glucose level cannot be maintained, the intensity of the exercise performed will decrease. If the exercise continued for a long period of time fat starts to contribute energy to continued activities. As the duration of exercise increases, protein may contribute to the maintenance of blood glucose levels through glucose exogenesis in the liver.

According to Gastelu and Burker (1999), the body always uses a mixture of carbohydrates, and fat, plus a little protein for energy. This energy mixture varies depending up on the intensity and duration of the physical activity and the composition of the food from which the energy is derived.

This idea revealed that as an athlete's training and competition level increases, the body's energy demands also increase. So, there are several energy system in the body can provide athletes with fuel as long as they are consuming the proper foods. When an athlete works near or at maximal intensities carbohydrates are the prime fuel the body can use. During prolonged exercise or training the amounts of fat and carbohydrate used may rise and fall depending up on:

- Duration and intensity of the exercise
- An individual's fitness level

- Food and drinks consumed prior to and during the exercise.

In the following session, the researcher tried to discuss the physiological importance of each nutrient to successful training and for optimal athletic performance.

### **2.9.2.1. Carbohydrates**

Carbohydrates- are organic compounds composed of carbon, hydrogen to oxygen. The ratio of hydrogen to oxygen is 2:1; the body gets the major part of its energy requirements from carbohydrates. They break down quickly and easily in the digestive system to form the basic fuel of glucose which is stored in the body as glycogen (Wilmore & Costil, 1999).

Carbohydrate is the primary fuel source for most athletes and showed constitute at least 50% of their total caloric, intake. They also stated that for endurance athletes' carbohydrate intake as a percentage of total calories in take should be even higher: 55% to 65%.

Everything eating and drinking plans for athletes need to provide enough carbohydrate to fuel their training programmes and also to optimize the recovery of muscle glycogen stores between training sessions and competitions(ibid).

Therefore, there are different types of carbohydrates that can be divided into different categories by scientists based on factors. For seek of this thesis the researcher tried to see main important categories of carbohydrates.

Not all the carbohydrate foods have in the same way in our bodies. All carbohydrates convert to blood sugar but some converse quickly, other more slowly (Thompson 2009). (Thompson 2009, Gastelu & Burke, 1999, Burke Louise, 1998, and Majumder, 2002) were classified carbohydrates into three categories based on Glycemic index s (GI):

1. High glycolic index carbohydrates
2. Low glycolic index carbohydrates
3. Intermediate glycolic index carbohydrates

The glycemic index (GI) is a ranking of carbohydrates on a scale from 0 to 100 according to the extent to which they raise blood sugar levels after eating.

Gastelu and Burke (1999) were mentioned the two importance of GI. The glycemic index is important for two primary reasons:

- It indicates the metabolic consequences that different foods can have, and
- It helps when foods with certain glycemic indexes need to be consumed at specific times. They were explained it with examples: for example, it is better to consume foods with low glycemic indexes for meals and snacks, since these foods help maintain the proper blood-sugar level and ensure a sustained energy supply conversely, during workouts and competitions, it is better to eat food with high glycemic indexes because those foods help spare glycogen in the body and supply quick energy to exercising muscles.

In deed Thompson (2009), tried to discuss about different Glycemic index foods as follows: “Foods with a high, GI are those which are rapidly digested and absorbed and results in marked fluctuations in blood sugar levels.” The high glycemic foods are considered to have a GI of more than 70. Eating high glycemic carbohydrates, ones that turn to sugary quickly, will decrease energy levels. When individuals eat high glycemic carbohydrate his/her blood sugar levels increased. When this happens his/her body produces the insulin to clear the excess sugars. In fact the body tends to overcome the produced insulin and so ends up by taking too much sugar out of the blood and lowering the blood sugar levels so it results lower of blood sugars than they should be and the athlete feels lethargic. In terms of increasing energy levels for athletes, the lower the GI is better in long lasting events.

In another way, low GI foods produce gradual rises in blood sugar and insulin levels because of their slow digestion and absorption. This more gradual fluctuation of blood sugar levels proven benefits for health and an individual's energy levels.

To provide some information in this portion after cross- checking much literature, the recent data has been taken to explain the GI value of the most common selected foods.

<b>Glycemic Index</b>	<b>Food</b>
	<b>High GI (&gt;70)</b>
100 -----	Glucose
80-90-----	corn flakes, carrots, instant mashed Potatoes, maltase, honey, etc
70-79 -----	Bread (whole grain), millet, white rice, and bread beans (fresh) etc
	<b>Moderate Glycemic index (55-70)</b>
60-69 -----	Bread (white), rice (brown), muesli Shredded wheat cereal, beet root water biscuits, bananas, mars Bars etc.
50-59 -----	Spaghetti, sweet corn, all bran cereal Digestive- biscuits, sucrose, potatoes chips etc.
40-49 -----	spaghetti (whole wheated, oatmeal, sweet Potatoes, beans (canned navy), dried peas, Oranges, orange juice, cold drinks (e.g. coke) etc.
	<b>Low Glycemic Index (&lt;55)</b>
30-39 -----	Butter beans, haricot beans, apples ice cream, milk (skim), milk (whole) Yogurt, tomato soup etc.
20-29 -----	Kidney beans, boatels, fructose, grapefruit Etc.
10-19 -----	soy beans, soybeans (conned), peanuts, Lettuce, cucumber, peppers, green beans

Table 1. Glycemic index of some selected common carbohydrate rich foods.

**Source:** Foster- Powell and Brand- Miller. International tables of glycemic index. American journal of clinical nutrition 62.1995. 87 1<sup>st</sup> 8935 as cited/adapted from Burke, Louis, 1998.

The above table1. Provides a list of the measured glycemic indexes of some common carbohydrate rich foods compared to a glucose standard. Here high glycemic index foods are generally considered to have a GI of above 70, while low glycemic Index foods are those with a GI below 55 and intermittent/moderate glycemic index foods GI falls between 55-70.

Therefore, identifying and having different carbohydrate foods based on their glycemic index to maintain the blood glucose/ sugar level by giving attention on type, intensity and duration of training is most advisable to athlete for successful training programme.

### **2.9.2.1.1 Carbohydrate for Increased Athletics Performance**

According to Gastelu & Burke (1999), were discussed that “to maintain their glycogen stores, athletes must focus on their carbohydrate intake on a twenty-four (24) hours basis and on a pre-event basis”. This means that they must devote attention to the following important factors:

- Maintenance of carbohydrate balance at each meal.
- Increase in carbohydrate intake before athletic events or exercise sessions.
- Ingestion of selected types of carbohydrates during and after exercise.
- Methodical build up of muscles and liver glycogen stores before events.
- Carbohydrate loading for events lasting more than one and a half hours for training or competitions.
- Ingestion of high amount of complex or low glycemic carbohydrates, with intake of increased amounts of high glycemic carbohydrates at breakfast, during exercise and directly after exercise to quickly replace depleted glycogen store.

So in general athlete should eat a plentiful amount of low glycemic carbohydrates with each meal and reserve high glycemic carbohydrate for special parts of the day. This means that athletes must make sure that they eat carbohydrates with every meal and with snacks.

According to Wilams, Lippincott & Wrilkins (2011) on the journal of optimal dietary intake guide tried to provide importance of carbohydrate intake to athletic performance as follows:

A diet rich in carbohydrates increases endurance performance because of the extra store of carbohydrates in the muscles and liver called glycogen (stored form of carbohydrate). Work completed in the early 1980's by David Costell at Ball State University showed that if athletes did not consume a diet high in carbohydrates on a daily basis, they should experience chronic fatigue and poor performance.

So, it is well documented that endurance athletes need to replenish carbohydrate stores in the body, especially during periods of intense training. Also consuming carbohydrates during workouts lasting over, one hour can also benefit performance and delay on set of fatigue.

The other issue that arise in a discussion of athletes' diet is the timing of meals and snacks common sense dictates that food and fluid intake around workouts needs to be determined individually and will depend, in part, on athlete's GI characteristics as well as the intensity of the work out. In any case depending upon the length of training sessions, an athlete's carbohydrate intake should be between 2.5-6.0 grams per pound of body weight, with longer training times requiring the higher number of grams.

#### **2.9.2.2. Fats**

Fats are a very concentrated source of energy weight for weight and it provide twice as much energy as carbohydrates. But fat is not as good an energy source as carbohydrate because it is digested very slowly and uses more oxygen to

produce this energy. Fat can be a factor, however, in supplying the energy requirements from event that last longer than two hours (Thompson, 2009).

Fats and carbohydrates are composed of the same basic elements, but in fat the relative hydrogen content is higher. Fats or fatty compounds are usually referred to as lipids and are generally classified as saturated, monounsaturated or polyunsaturated fats (Klafs & Arnheim, 1981).

According to Klafs and Arnheim (1981) explanation fats provide more energy per gram than either carbohydrates or proteins, but body efficiency appears to be about 4.5% less on a fat diet than on a carbohydrate diet. This idea is supported by Astrand and Rodahl (1977) the ability to utilize fat as a fuel depends on the oxygen- transporting capacity, the choice of fuel for the working muscles depends on the work load in relation to the individual's maximal oxygen uptake.

Fats (liquids) are necessary in human body for numerous reasons. They contain the fat soluble vitamins A, D,E and K. They are a source of the essential fatty acids, which play many vital roles in maintaining the functioning and integrity of cell membrane. The most prevalent type of lipids is the triglyceride. As energy source, the triglyceride varies in importance according to the type of exercise performed. For endurance sports, such as marathon running, triglycerides are the primary source of energy. For power or speed sports such as sprinting, glycogen is the primary source (fuel), but some triglycerides are also used. So, it is important to understand that the body is constantly metabolizing triglyceride for energy. The main functions of fat in human body is to provide insulation, aid in the absorption of the fat soluble vitamins, act as energy stores, supply essential fat acids, supply building block for other molecules.

But the main problem with lipids is, most athletes consume too much total lipid, too much of the wrong lipids and not enough of the good lipids. As indicated in many recent studies in Majumdar (2002), while lipids (fats) are

necessary for health too much of the wrong kinds of lipid can have negative effects on the body and can lead to certain and cardiovascular diseases.

Of course, too much of any fat can cause obesity. So, most experts recommended a total dietary fat intake of less than 30 percent of total daily calories, some recommends keeping liquids under 20 percent.

Therefore, fat intake should range from 20% to 30% of total energy in take. For athletes consuming  $\leq 20\%$  of energy form fat does not benefit performance (Rodriguez, et al, 2009). Both fat soluble vitamins and essential fat acids, is important in the diets of athletes. High-fat diets are not recommended for athletes.

This thesis mainly give emphasize in this faction about fatty- acids that plays great role on athletic performance.

There are hundreds of different fatty acids and they come in various lengths, from four to twenty-four carbon atoms long. Scientist tried to classify fatty acids in different way.

Burke and Gastelu (1999) revealed the main important function of essential fatty-acids to existence and to good performance as follows:

- Maintenance of proper brain nervous- system functioning.
- Assistance in wound healing.
- Reduction of the time required for recovery by fatigued muscles after exercise by helping clear away lactic acid.
- Growth enhancement.
- Involvement in the transfer of O<sub>2</sub> from the lungs to the blood stream etc.

According to Wilmore and Costill (1999) fats derived from animal sources generally contain more saturated fatty acids, than fats derived from plants (less- saturated).

Indeed Burke & Gastelu, (1999) stated that: fats from plant sources tend to be healthier than fats from animal sources.

As general, having less saturated fatty acids of plant source and low cholesterol is more advisable to health diet.

### **2.9.2.3. Protein**

Maughan (2000) Protein has been traditionally considering a key nutrient for sporting success and the athlete in training needs more protein than others. But, in recent years sufficient scientific research studies allowed the referee to step into the ring with a final verdict and the decision is protein requirements are increased by exercise:

- Firstly, to account for the small contribution of protein to muscle fuel and
- Secondly, to account for any extra muscle that is laid down.

So, proteins are the main body building and repair nutrient. Athletes are needed to build new body tissue during growth and also used to repair any damaged tissue, because there is a constant need for a regular protein intake (ibid).

According to Wilmore and Costill (1999) definition protein is a class of nitrogen-containing compounds formed by amino acids. Protein serves numerous functions in human bodies:

- It is the major structural components of the cell.
- It is used for growth, repair, and maintenance of body tissue
- Hemoglobin, enzymes, and many hormones are produced from it.
- Normal blood estimate pressure is maintained by proteins in the plasma
- Antibodies for disease protection are formed from it.
- Energy can be produced from it.

There are about twenty- two amino acids that are considered biologically important. In light of this idea, Wilmore and Costill, (1999) identified twenty amino acids as necessary for human growth and metabolism of these, eleven or twelve are termed non essential amino acids, meaning that our bodies synthesize them, so we don't rely on dietary intake for their supply. The

remaining eight or nine are termed essential amino-acids because our body cannot synthesize them; they are an essential part of our daily diets.

Therefore, a dietary protein source that contains all essential amino-acids are very essential to body to maintain. Many scientific research studies were classified proteins into two: complete protein like meat, fish poultry eggs and milk and its product; and incomplete protein like vegetables and grains because they do not supply all the essential amino-acids.

Furthermore, Thompson (2009) explained about protein in detail as follows: “protein quality” relates to how many of the eight essential amino acids a food supplies. He tried to classify protein in to two:

- High quality proteins are generally animal proteins such as egg protein, milk protein fish and meat protein.
- Lower quality proteins are found in plants such as nuts, lentils and beans. For a person who does not eat meat or animal products a wide variety of plant proteins must be eaten to obtain all the necessary amino acids for health.

Most athletes consume diets with more protein than they can easily use without the use of protein supplements. The athletes most at risk of failing to meet their protein requirements are those with severely restricted energy intake or little dietary variety.

In fact, according to Burke (1998) believes for many athletes, total protein needs will still be met by the general recommendation of 1 gram of per kilograms of body-weight. E.g. 60g for a 60kg athlete. But athletes whose daily training seasons are lengthy and intense (burning up a significant total of protein fuel) or who are in a muscle gain stage of their programmes, will require an increase in their protein allowance. Athletes who are growing will need to cover these physiological requirements as well.

In general the protein requirements for various groups of athletes as follows (ibid).

- General sport activity 1g of protein for every kg of body weight
- Strength- training athletes (aim for the high end of range during muscle gain protein). 1.2 – 1.6g of protein for every kilogram of body weight
- Endurance training athletes (aim for the high end of range For very prolonged strenuous training). 1.2 -1.6 gram of protein for every kg of he/she weight
- Adolescent and growing athletes 2g of protein for every kg of body weight

In general, athletes should earmark about 12-15% percent of their total energy intake to meet these recommended levels.

The timing of protein intake can help to ensure that the body uses as much as possible in recovering and adapting to training. Especially protein is only oxidized when the body is in extreme of starvation or near exhaustion ( Honeybourne et al.1996).

According to Burke and Maughan (2002) animal protein foods contain a good variety of amino acids including all the essential ones. On the other hand, plant foods tend to have one or more of the essential amino acids in short supply. This could be a problem if plant foods make up most or all of their diet for example if athletes are vegetarian.

What should be done to get appropriate amount and all essential amino- acids to vegetarian? Wilmore and Costill (1999) revealed that athletes who are strict to vegans must be very carefully in the selection of the plant food they eat to provide a good balance of the essential amino acids, sufficient calories, and

adequate source of vitamins and minerals. In light of this idea, Burke (1998), stated that, but cleverly mixing and matching different plant protein foods that total amino acid picture can be achieved. This is known as complementing vegetable proteins, and can also be done by mixing a vegetable type with a small amount of animal protein such as a dairy food.

Furthermore, Burke and Gastelu (1999) revealed that; by eating a variety of foods, it is easy to obtain enough quality amino-acids from plant sources. Each day, the vegan should select foods from at least two of the following three groups:

- Legumes- all kinds of dried peas and beans, soybeans, tofu, peanuts.
- Grains- cereals, breads, pasta, corn, rice wheat.
- Nuts and seeds- sesame and sunflower seeds

The importance of proper protein intake to maximize performance is obvious. Choosing high quality food protein sources and properly using protein and amino-acid supplements is essential.

But young athletes who are eating a wide range of foods should not need to use dietary supplements and coaches and athletes should be aware that these do not provide a short cut to success.

Therefore, ingesting the correct amount of protein based on their body size and activity level can help to maintain their body weight and improve athletes healing and recovery abilities.

#### **2.9.2.4. Water**

Water is one of the most important nutrients for health and performance. Studies have verified that even a minute fluctuations in the body's water balance can, and often do, adversely affect performance. In spite of this, many people take water for granted or neglect it. This is especially true for athletes and non athletes (Wilmore & Costill, 1999).

### **2.9.2.4.1. Water and the Athlete**

Water, whimsically called H<sub>2</sub>O by many people, consists of two hydrogen atoms and one oxygen atom. There are many scientists or researcher attempt to reveal about the role of water in exercise and performance. Water is our most impotent nutrient and we would die much more quickly if deprived of water than we would have deprived of any other nutrient (ibid).

In light of this idea, Burke (1998) stated in similar manner: water is your most important nutrient. The effect of dehydration is quickly felt and affects not only performance, but at times can endanger your life itself.

Furthermore, Thompson (2009), tried to discuss the extreme importance of water as follows: Athletes can live for several weeks without food, but they will be die within a few days without water. Also he mentioned that: Athletic performance is affected almost immediately if the body's water requirements are not met. So, water is one of the most impotent nutrients required by the body.

Among its most important functions, has been forwarded by (Burke & Gastelu, 1999; Wilmore & Costill 1999; Maughan & Burke, 2002, and Majumdar, 2002) they stated as follows:

- Water is the aqueous medium used for transporting the body's food materials and the place where the body's biochemical reactions occur.
- Water regulates body temperature and maintains blood pressure for proper cardiovascular function.

Water is found throughout the body, and depending on an individual's body fat, it can vary in content from about 45 percent in very obese individuals to 70 percent in very lean individuals. The different parts of the body also vary in water content. For example, blood normally has the highest water content at about 83 percent muscle tissue has a water content of about 75 percent; bone is about 22% water and fat tissue is only about 10 percent water.

A body's degree of hydration is affected by the person's rate of water intake in relationship to his/her loss of water lost from the body in different mechanisms.

As to Maughan (2000) water loss, occurs from the body by the following four mechanisms:

- Evaporation from the skin in the form of sweat.
- Evaporation from the respiratory tract.
- Excretion from the kidneys as urine form.
- Excretions from the large intestine with feces.

Therefore, athletes have become more aware of fluid needs in the training and competition, but many athletes completely forget about the importance of the water. But it is an essential part of their training nutrition to look after day-to-day maintenance of fluid balance.

Also Burke and Gastelu (1999) were discussed: water intake varies with the size of the individual, the duration and intensity of the training session and the weather. Also water losses affected by factors such as the ability to acclimate to the temperature, the duration and intensity of the activity, the rate of sweating, the weight of the clothing worn, health, gastrointestinal problems, alcohol and caffeine consumption, the use of diuretics and other medication and body fat.

The majority of water loss 60% when at rest occurs from kidneys, which excrete water and waste products as urine, 5% with sweating, 5% also excreted from large intestine in the feces.

According to Wilmore and Costill, (1999), the amount of sweat produced during exercise is determined by:

- Environmental temperature,
- Body size and
- Metabolic rate

In their believes, this three factors influence the body's heat storage and temperature. Heat is transferred warmer to cooler area and heat loss from the

body is impaired by high environmental temperatures. Body size is important because large individuals generally need more energy to do given task; therefore, they usually have higher metabolic rates and produce more heat. But they also have more surface area, which allows more sweat formation and evaporation.

Many recent studies show, in Maughan and Burke (2002), as exercise intensity increases, so does the metabolic rate and this increases body heat production, which in turn increases sweating. To conserve water during exercise blood flow to the kidneys decreases in an attempt to prevent dehydration, but like the increases in metabolic water production, this too may be insufficient. During high-intensity exercise under environmental heat stress, sweating and respiratory evaporation can cause rapid losses of as much as 2 to 3 liters of water per hour. For example, during an event such as the marathon, sweating and water losses from respiration may reduce body water content by 6% to 10%, despite drinking fluids during the event. Thomposon (2009) also forwarded: athletes need to drink more, if they exercise hard, as they can lose a lot of water through sweat, particularly in climates. The order to prevent the negative effects of dehydration on performance athletes must take fluid during training.

Maughan (2000), found the some benefits of fluid intake during exercise. Especially during hot weather: water intake will minimize:-

- Dehydration
- Body temperature increases, and
- Cardiovascular stress

#### **2.9.2.4.2. Effects of Dehydration on Performance**

Dehydration can and does affect athletic performance (Burke & Gastelu, 1999). As the body loses water the core temperature rises. This affects all the metabolic pathways, interferes with cardiovascular functioning and reduces total exercise capacity. When the water losses reach 1 to 4 percent of the body weight, athletic performance is reduced. In light of this, Wilmore & Costill

(1999) is discussed that when a person is dehydrated by more than 2% of body weight both heart rate and body temperature are elevated during exercise. If the loss reached 4% or 5% of the body weight, the capacity for prolonged aerobic effort declines by 20% to 30%. So, dehydration is when not enough water has been taken into replace what has been lost from the body.

According to Majumdar (2002) chronic dehydration will develop in any athlete who does not make an effort to remain adequately hydrated. The thirst response in athletes is not as finely tuned as it should be. This means that the body can enter a state of dehydration and also performance may be already reduced. Therefore, athletes should not rely solely on their thirst response, but should instead, make a point to keep hydrating their body all day long. To overcome the problem of dehydration, drinks should be taken often and in small amounts before, during, and after training or competition.

Daily hydration guidelines are important for all athletes to follow. Many recent scientific studies have shown that endurance athletes who compete for a period longer than thirty minutes improve their performance by drinking fluids during the activity. Athletes competing in shorter events need to be properly hydrated from the start to achieve peak performance. Therefore, daily hydration is vital for every one- endurance- athletes and even non athletes (ibid).

#### **2.9.2.4.3. Major sources of water**

According to Majumdar (2002), the major sources of water for the human body are:

- **Liquids**- most abundant source of water for the body accounting for about 2/3 of a person's water intake per day. E.g. pure water (fastest to absorb).
- **Food**- all foods consist of water and solid. The amount of water that a food contains depends on what the food is. For example, fruits vegetables, cooked cereals, and milks are 80 to 95 percent water. Meat cooked rare is about 75% water, while meat cooked well done is about 45

percent or less water. Generally, approximately one third of daily water intake is from food.

- **Metabolic water-** It is the water that is produced in the body as a result of energy production total approximately 10% ounce per day.
- **Glycogen-bound water-** is the stored water in the muscles a long with glycogen.

## **2.9.2.5. Vitamins and Minerals**

### **2.9.2.5.1. Vitamins**

In the correct sense of the word, vitamins do not provide energy- that is; they do not contribute any kilojoules to the body, but various vitamins are involved in the production of energy from fuel stories, by acting as catalysts for metabolic reactions. Vitamins are involved in many reactions too including the production of red blood cells, the repair of tissues, and the synthesis of protein. Therefore, when vitamin levels drop below a certain mark, these body processes will be impaired and sports performance has been shown to be affected (Burke, 1998).

According to Burke and Gastelu, (1999), Athlete to do their best-and to stay healthy and injury-free-athletes must be mindful about what they eat. Athletes also need to take vitamins supplements, which are an integral part of any carefully crafted dietary program.

Vitamins are organic substances that are essential for metabolism, growth, and development of the body. All vitamins must be obtained from food or supplement source. In general, vitamins are organized into two group- the fat soluble vitamins, including vitamins A,D,E and K; and water soluble vitamins, including the B-vitamins and vitamin C. The fat soluble vitamins are stored in the liver and fatty tissues of the body whereas the water soluble vitamins are excreted in the urine.

So, vitamins are needed daily, but only in tiny amount. They play an impotent part in many chemical processes that take place in the body. Thompson (2009)

stated that, low vitamin levels can reduce athletic performance and if a vitamin is always low, or missing, from their diet they could become ill. Athlete must ingest proper amount vitamins to being health and to improve their performance. Vitamins are found in different proportions in all natural foods and are highest in fresh food.

- Vitamin A: (helps to keep skin smooth and soft and helps to see in dim light. Good source of vitamin A are: liver, Fish, oils, eggs, leafy green vegetables, yellow fruits and vegetables like carrots and apricots).
- Vitamin B: (helps to regulate absorption and distribution of calcium for strong bones and teeth. Good sources are: butter margarine, Fish oils, eggs, beside of produced in sunlight).
- Vitamin C: (helps to heal wounds and bind cell. Helps present fatigue and resist infection. General body maintenance. Good sources: citrus fruits such as oranges and grapefruit green vegetables, Tomatoes potatoes.

Both the fat-soluble and water soluble vitamin content of food is affected by how the food is stored and cooked. Because of this reason, keeping in good condition of all foods is advisable to get appropriate contents of food.

The longer food is stored the more vitamins are lost canning removes more vitamins than freezing cooking can also remove many vitamins. Raw, uncooked vegetables are best, flowed in order by steaming, baking boiling and frying (ibid).

#### **2.9.2.5.2. Minerals**

Minerals, like vitamins, are also needed in small daily amount. They include calcium, sodium, potassium, iron and iodine. As stated by Burke (1998), minerals are essential for the proper function of nerves and muscles and help build body structure such as bone, teeth muscles and skin. A well- balanced diet will normally supply all the minerals needed for health.

According to Thompson (2009), Iron is a mineral which is essential for the transport of oxygen in the body. Women in particular because of menstrual blood loss may have difficulty in getting enough iron from their diet.

In light of this idea, Burke (1998) stated that iron is an important nutrient in sports performance, since it is a component of the oxygen carriers in the blood (called hemoglobin). Also iron is involved with some of the enzyme that promote exercise metabolism. So iron deficiency this reduces O<sub>2</sub> supply to muscles as well as slow metabolic reaction. Athletes with very low iron store complain of tiredness and poor recovery from training. If the situation worsens and blood hemoglobin levels become lowered (called anemia) the symptoms become more drastic-severe fatigue cramps, headaches, and often shortens of breath. In all this conditions reduced in actual performance.

The two reasons that challenge athletes to fulfill iron requirements are:

- Females need to eat more iron than males' counterparts to account of the blood losses of menstruation.
- Heavy exercise increases iron requirements, by increasing iron losses from the body. Iron can be lost through sweat and gastrointestinal bleeding.

Because, athletes, especially females must give great attention to have essential minerals. To get good iron athletes must eat the following foods: liver, red meat, eggs, beans, lentils, yeast etc.

**Iodine-** Helps to regulate all body functions and controls the rate that energy is released from food. Good sources are: salt water fish, fruit, and vegetables.

**Calcium-** makes bone and teeth and helps to blood clotting. Good sources: milk, cheese, green vegetables, bread and nuts.

The calcium is more, required for growing and pregnant athletes than others.

**Sodium-** used to controls body's water balance and found in all cells. So, the main sources of calcium are: table salt and most foods.

To get all these functions, and for performance success, athletes must give great attention to get a balance diet.

## **Fibre**

Fibre is an important part of the diet, but is not absorbed by the body and is often ignored as a nutrient. Fibre is a substance found in every plant cell. The tough layers around grains of wheat, oats and rice are also a type of fibers called bran (Maughan, and Burke, 2002).

Furthermore, Thompson, (2009), stated that: Fibre foods are to natural laxatives. They are essential in adding bulk to food as it passes through the digestive system. Natural plants are generally high in fiber. But processed foods such as white flour, white rice and white pastas are not so good to eat, as they have had much of their fibers content removed in manufacture.

Indeed, Burke (1998), stated about importance of fibres as follows: Different types of fibres exerts different effects on the digestion and metabolism of food in the body. These include aiding digestion, regulation blood glucose and blood cholesterol levels, and reducing the risk of some cancers. In addition, fibre is useful in making food and meals filling- an invaluable aid when athletes cutting back on kilojoules to lose body fat.

Fibre is found in different types of foods that more precisely occurs naturally in fruits and vegetables foods.

So, the best guideline is to eat fibre as it naturally occurs in the variety of foods that we eat. This will ensure that athletes get a mixture of the fiber types, and that the quality of fiber varies with their energy and nutrient intake.

Like anything else, too much fiber is disadvantageous. Therefore, too much fiber intake, or a sudden increase in fiber intake can exceed the stomach comfort limit, which may lead to flatulence and diarrhea. Fibre- rich foods may not be the best choice just before training or competition (Majumdar, 2002).

So, athletes must follow a sensible amount and variety of fiber intake to proper effect in their body. In light of this, Burke (1998), forwarded some hints for increasing fiber intake:

- Try to choose food with the fiber content left intact by selecting whole-wheat breads and breakfast cereals, whole-wheat pastas, and brown rice.
- Enjoy some of their fruits and vegetables raw-for example, fresh fruit, salads, crunchy vegetable stick, fruit salad, whole fruits with milk or yoghurt and eat the skins and seeds where appropriate.
- There is probably no need for adding fiber such as unprocessed bran unless they are part of a whole food recipe.

The following recommendation and statements made below were reflects from the conclusion of the IAAF consensus conference on nutrition for athletes held in Monaco in an April 2007. And published nutrition for athletes a practical glide to eating and drinking for health and performance in track and field (Adapted from Thompson, 2009 introduction to coaching: the official IAAF guide to consisting athletics.)

- A healthy and balance diet is one that maintains on individual's energy balance and nutrient. It need not be expensive and should simply follow these guidelines, where the coach should encourage the athlete to:
- At lots of different kinds of food such as vegetable, fruits, fish, meats, dairy produce and grains.
- Try to eat a rainbow of fruits and vegetables every day- the strong colors of many fruits and vegetables are an indication of a high content of varies vitamins choose from:
  - White- such as cauliflower, banana, onions and potatoes
  - Green- such as green apples and grapes
  - Orange/yellow- such as carrots, sweat potatoes, applicants, peaches, oranges, mangos and papaya.

- Red- such as tomatoes, watermelon, red apples and red pepper.
- Eat fresh food rather than ready prepared frozen or canned foods.
- Eat a high proportion of low glycol carbohydrate rich foods.
- Avoid fatty meals and sweet or salty snack.
- Drink small amounts of water and fruit juice often.
- Check fiber intake by eating whole meal breads, cereals, and pastas and eat brown instead of white rice's.
- Flavor foods with herbs and spices rather than salts unless sweat losses are very high.

The proper nutrition can create a healthy body which performs better and help the athlete to recover and adapt from training and competition (Thompson, 2009). Therefore, encouraging and helping athletes to develop a healthy diet is one of the key responsibilities of the effect coach. Whenever possible the coach should think carefully about applying these principles to their own diet for their own well-being and to provide a suitable role model.

Therefore, encouraging and helping athletes to develop a healthy diet is one of the key responsibilities of the effect coach. Whenever possible, the coach should think carefully about applying these principles

## **2.10. Dietary Intake Before, During and After Exercise**

The food and fluids that an athlete eats and drinks before, during and after workout are important for both comfort and performance during exercise. So, giving attention to when, should athletes eat and drink before, during, and after training or competition is most important, beside to type and amount of foods they consumed.

### **2.10.1. The Pre-event Meal**

The Pre-event meal is another nutritional practice that has attracted superstition and ceremony over the year. Its value to performed can vary from positive (in the case of an athlete who is still carbohydrate depleted from a

previous event), to neutral or cosmetic value (for the athlete who is already well fueled and hydrate) and finally to a negative or disastrous effect (an athlete who chooses the wrong food and suffers a gastric upset during the events). When the physiological effects of a pre-event meal are minor, the psychological factor can be greater important (Burke, 1998).

Carbohydrate intake before exercise can help to restore sub-optimal glycogen stores which is critical for prolonged periods of exercise. Eating before exercise, as opposed to exercising in the fasting state, has been shown to improve performance. The meal or snacks consumed before competition or an intense workout should prepare athletes for the upcoming activity, and leave him or her neither hungry nor with undigested food in the stomach (Maughan, & Burke, 2002).

In light of above idea, Burke and Gastelu (1999) stated that, before exercise athlete meal should high in carbohydrate, moderate in protein and low in fat. They should eat this food about three hours before beginning the exercise/competition.

Similarly, Burke (1998), proposed that pre-event meals and snacks should contain sufficient fluid to maintain hydration, be low in fat and fiber to facilitate gastric emptying and minimize GI distress, be high in carbohydrate to maintain blood glucose levels and maximize glycogen stores, contain a moderate amount of protein, and be consumed of foods familiar to the athlete.

The size and the timing of the pre-exercise meal are interrelated. Because most athletes do not like to compete on a full stomach, smaller meals should be consumed in closer proximity to the event to allow for gastric emptying; larger meals can be consumed if more time is available before exercise or competition.

Maughan and Burke (2002) mentioned some goals of pre-event meals (1-4 hours pr- event) as follows:

- Continue to fuel muscle glycogen stores, if they have not been fully restored or loaded since the last exercise session.
- Restore liver glycogen content, especially events undertaken in the morning there liver stores are depleted from an overnight fast.
- Ensure that the athlete is well hydrated.
- Prevent hunger, get avoid the gastrointestinal discomfort and upset often experienced during exercise and
- Leave their feelings confident and ready to perform at their best.

Furthermore, Burke (1998), revealed that, the importance of the pre-event meal in topping up fuel and fluid levels depends on the timing of the last major training or competition session, the degree of depletion of caused by this session, and the amount of carbohydrate and fluid consumed since. Burke also stated that athlete who compete (train) early in the morning will have to juggle the need for sleep against the need for adequate time to digest prevent meals and snacks, while muscle glycogen levels can be prepared in the days leading up to the event, liver stores are more labile and need to be restocked after the night's fast. So, moderate sized carbohydrate meals on the morning of the event will be sufficient for this task. However, if the events/training starts too early too allows 3-4 hours for a meal to digest, the athlete may choose a smaller carbohydrate meal 1-2 hours pre-event. To compensate for this, the athlete could pay more attention to carbohydrate intake during the training, thus supplementing the livers ability to maintain blood glucose levels during prolonged training or computations.

Whether they are participating in an endurance or non endurance event, athletes should load up on water about two hours before their training or competition. Depending on their body weight, athletes should consume between 18 and 24 ounces of water. And also fifteen to twenty minutes before their training or event, drink another 12 to 20 ounces of water. Do not allow to drink any alcohol, coffee or other beverages that tend to act as diuretics (ibid).

According to Thompson (2009), Athletes performing training in morning may choose a breakfast according to the amount of food that can be comfortably eaten before the start of the training. Early afternoon event might be tackled with breakfast and a mid-day top-up, or a single larger lunch. All athletes should experiment with their prevent meal plan so that they can come up with strategies that build up confidence as well as fuel stores. Eating a small amount of solid food immediately before competition or training is much better than eating too much.

But in contrast when athletes eat only as much food as hunger dictates, they often fail to consume enough carbohydrate to compensate for the amount used during training or competition. This imbalance between glycogen use and carbohydrate intake might results some athletes to become chronically fatigued and need 48 hours or more to restore normal muscle glycogen levels. So, athletes who train exhaustively on success sine days require a diet rich in carbohydrate to reduce the heavy, tired feeling associated with muscle glycogen (Wilmore & Costill, 1999).

Here, most commonly identified guidelines for planning pre-event meal would be discussed below as follows. Athletes are individuals and require different foods and their body responds differently to certain foods. Generally speaking, the guidelines below proposed with different scientists that help athletes to consume the proper nutrients before training or competition:

Thompson (2009), identified the following guidelines to plan pre-event meal;

- Allow 3-4 hours before an event for a large, high-carbohydrate meal (500-1200 calories). Allow 2-3 hours before an event for a small, high-carbohydrate meal (200-500 calories) and allow 1-2 hours for a high carbohydrate snack (100-200 calories).
- Choose high –carbohydrate, low-fat foods to ensure easy digestion and to top-up carbohydrate fuel supplies.

- Avoid high-fiber, gas forming foods. These foods may stimulate bowel activity and cause discomfort during activity.
- Restrict fats and proteins since they are slowly digested. If they eat meals that are high in protein, they may become dehydrated during training because their kidneys require extra water to excrete protein wastes.
- Drink small amounts of water often, before and after training or competitions and during if it is a prolonged endurance training or competition or has several efforts in a single day.
- Experiment during training with various foods and portion sizes to determine appropriate types and amounts for you.
- It is important to eat some carbohydrate before morning events, especially, if you are competing in endurance length events. If the liver's glycogen stores are low from an overnight fast, you may be less able to maintain blood glucose levels, especially late in the event. Experiment with a small snack or carbohydrate drink, if time is short. In addition condensate for low liver glycogen store by consuming carbohydrate during the training.
- Don't try new foods prior to an important event stick with tried and true favorites that you know will be well tolerated.
- In sports where you must weigh- in prior to the event to meet a weight division, you will probably, choose to leave you pre-event food and fluid intake until after the weigh-in. This used sensible weigh control measures to reach your weight target, so your pre-event meal will only need to top – up fuel and fluid stores.

Also, Maughan and Burke (2002), Burke (1998), revealed the pre-event meal ideas as following.

- Breakfast cereal\* +skim milk + fresh+ canned fruits
- Baked potatoes with low fat filling
- Pasta\* with tomato-based or other low-fat & sauces
- Sandwiches\* with banana fillings
- Muffins\* or crumpets +jam/honey

- Creamed rice or rice cream
- Fresh fruit or fruit salad
- Sport drinks with breakfast bars
- Fruit smoothie made with milk, yoghurt & fruit
- Crumpets\* with honey etc
- Liquid meal (liquid supplements)
- Mealier meal +skim milk
- Pancakes +syrup

**Note** \* is for low-fiber meals choose “white” types of cereal food.

This information is about help athlete to select and have (eat) pre-event meal-with high carbohydrate and low fat foods.

### **2.10.2. Eating and Drinking During Exercise**

According to Maughan and Burke (2002), ingestion of food and fluid during exercise has the potential to improve performance by influencing one or more of the factors that limit exercise performances. Prolonged hard exercise is facilitated with an increased body temperature, decrease in body water content due to sweat loss, and a fall in the body’s liver and muscle glycogen stored. All of these factors can impair performance by reducing exercise capacity and, in some circumstances, by bringing an impairment of skilled movements and decision making.

Furthermore, Burke and Gastelu (1999), stated that athletes should drink water or a sports beverage containing water plus 70 to 100 calories of carbohydrate per serving and a supply of the electrolytes. For practice sessions and event lasting more than two hours, athletes must consume a drink containing adequate amounts of carbohydrates and electrolytes. Preferably, the drink should consist of glucose or sucrose mixed with a complex carbohydrate such as malt dextrin. For events less then two hours long, athletes should still try to drink at least water to rehydrate their body. But the benefit of drinking beverages containing carbohydrate and electrolytes are less clear for exercise sessions lasting less than two hours.

Another author, Burke (1998) tried to explain the effect of fluid intake during training or competitions. There has been a popular belief among athletes that performance is not significantly impaired until a critical level of dehydration is reached most commonly thought to be around 5 percent of the body weight (i.e. 2.5 liters for a 50 kg athlete and 3.5 liters for 70 kg athletes). However more recent studies have established that there is no critical point but rather a gradual erosion of performance as the degree of dehydration increases.

So, any athlete undertaking an event with duration in excess of 30-60 minutes of high intensity exercise (particularly in hot conditional) should consider their fluid levels. In many sports the disadvantages of dehydration can be removed, or at least reduced, by the consumption of fluids by athletes during the training.

The following comments have been summarized based on the current understanding about dehydration on performance as follows (ibid).

- Any level of dehydration impairs the performance of prolonged aerobic exercise, but the effects become significant when fluid losses exceed 2 percent of body weight (e.g. 1kg for a 50 kg athlete, and 1.4 kg for 70 kg athletes).
- The effects are more pronounced when exercising in hot conditions.
- The effects of dehydration vary according to the way athletes became dehydrated.
- Dehydration also affects mental functioning, decision making, concentration and skill.
- Dehydration above 3-4 percent of body weight greatly increases the risk of gastrointestinal discomfort and upsets. But any fluids consumed may not effectively rehydrate the athlete. In the worst case scenario, bloating may stop the athlete from consuming more fluids, and vomiting may add to dehydration woes (ibid).

Drinking water during endurance events is to replace sweat lost. Take special care on hot, humid days, which are the worst for athletic activities because it causes the most sweating with the least amount of most sweating with the least amount of evaporation. Ideally drink during training 6 to 9 ounces of cool water every 15 to 20 minute (Burke, 2002).

### **2.10.3. Post –Event meal/Recovery**

In the world of sport, success is often determined by the athlete’s ability to recover between one exercise bout and the next. In sport such as track and field, athletes compete in a program of brief races- heats, semifinals, and finals –often performing more than once each day.

Perhaps even more impotently, the daily training program for many sports level, involves one or more workouts with less than 24 hour separating each sessions. The ability to recover between training without succumbing the effects of cumulative fatigue and injury is a key characteristic of the top athletes (Manghun and Burke, 2002).

Indeed, the training schedules of many athletes pos a similar challenges to optimize recovery between, sessions, a particularly when two or even three hard sessions are planned each day. So, in all cases, performance is dependent on their ability to recover from one session and present themselves at their best for the next (Burke & Gastelu 1999).

Nutritional –recovery issues has been discussed by (Burke and Gastelu 1999, Maughan 2000; Majumdar, 2002) as follows:

- Restoration of muscle and liver glycogen stores;
- Replacement of fluid and electrolytes last in sweat;
- Regeneration, repair, and adaptation process following the catabolic stress and damage caused by the exercise.

In deed Thomposn (2009), found that recovery after a training session or competition is the beginning of the process of adaptation and becomes part of the preparation for the next training session or competition. Replacement of sweat losses is an eventual part of this process. Both the water and salts, lost in sweat must be quickly replaced. The athlete should aim to drink about 1.2-1.5 liters of fluid for every kg of weight lost in training or competition. If sweat lost high then sports drinks containing sodium can be used, if not food is taken at this time.

So, quick recovery is an extremely important aspect of training. Especially during repeated day of training, it is impotent to recover as quickly as possible. Dietary measures have been shown to influence recovery significantly.

In light of this idea, Maughan (2000), revealed that, restoration of muscle glycogen stores and fluid balance after heavy training or competition is probably the most important factors determining the time needed to recover. The rate at which glycogen be formed (synthesized) is dependent on several factors.

- A. The type of CHO
- B. The quantitative CHO ingestion
- C. Timing of CHO ingestion after exercise etc.

### **2.10.3.1. Types of Carbohydrate ingestion**

Maughan and Burke (2002), conclude that: carbohydrate rich foods with a low glycemic index are less effective than those with a high Glycemic index in restoring muscle glycogen level.

In light of this idea, Burke (1998), in his studies show that low glycemic index (GI) carbohydrate foods such as lentils and legumes may be less suitable for speed glycogen recovery and should not be the main carbohydrate source in

recovery result. Therefore, athletes after training must select carbohydrate with high-glycolic index foods increase rate of the recovery.

### **2.10.3.2. The quantity of CHO ingestion**

Daily intakes of 8-10g of carbohydrate for each kilogram of body weight are needed to restore maximum amounts of glycogen. In extreme cases, when athletes are exercising intensely for 6-8 hours or more each day, greater intake may be needed to cope with recovery and on going daily needs, as well as to meet huge energy demands (Burke, 1998).

### **2.10.3.3. Timing of Carbohydrate Intake**

When carbohydrate was consumed immediately after an exhausting session (two hours of riding on a stationary bike), there was immediate and rapid synthesis of muscle glycogen over the next couple of hours-twice as fast as when carbohydrate intake was delayed. In fact the rate of synthesis in those first two hours was slightly faster than the rate of synthesis in the subsequent hours, even plenty of carbohydrate was consumed later. It appears that muscles remain active for a short time after exercise session has finished. This means that blood flow will continue to be diverted to the muscles, and that the muscle cell will continue to be able to take up glucose across its walls at an accelerated rate. Since depleted muscle enjoy an enhanced glycogen synthase enzyme activity, all the conditions are there to stimulate a fast synthesis rate. However, this Window of opportunity seems to close after about two hours, and glycogen storage drops back to a more typical rate. From the most important news from this study is that recovery doesn't really begin until carbohydrate is consumed. Therefore, the athlete who has an event or training session coming up soon needs to start eating to start refueling.

Similarly, Maughan and Burke (2002) found that: The highest sustained rates of glycogen storage occur during the first few hours after exercises. In addition

to the activation of the glycogen synthetase enzyme, early post exercise recovery is marked by an exercise-induced permeability of the muscle cell membrane to glucose and increased muscle sensitivity to insulin. So, carbohydrate feeding during these early stages appears to accentuate these effects by increasing blood glucose and insulin concentrations. The intake of carbohydrate immediately after prolonged exercise has been shown to result in higher rates of glycogen storage during the first 2 (two) hours of recovery, slowing thereafter to the more typical rates of storage by half.

According to Majumdar (2002), to ensure the rapid restoration of muscle fuel stores, athletes should consume about 1 gram of carbohydrate per kilograms of body-weight as soon as possible after the finish of the session (i.e. within 15-30 minute). However, failure to consume carbohydrate in the immediate post exercise phase of recovery leads to very low rate of glycogen restoration until feeding occur. This strategy is most important when there is only 4-8 hours of recovery between exercise sessions but may be of less significance when there is a longer recovery time (24 or more hours). Over all it appears that when the interval between exercise sessions is short, the athlete should maximize the effective recovery time by beginning carbohydrate intake as soon as possible. However, when longer recovery periods are available, the athlete can choose their preferred eating schedule as long as total carbohydrate intake goals are achieved.

Thompson (2009), revealed that the athlete should aim to drink about 1.2-1.5 liters of fluid for every kilogram of weight lost in training or competition. If sweat loss is high then sports drinks containing sodium can be used, if not food is taken at this time. Thompson said that it has been found that, a small amount of a high quality protein combined with carbohydrate helps the adaptation to training if taken soon after the training session.

Athletes can speed up the recovery of muscles glycogen stores after portaged exercise , by eating carbohydrate food immediately after they complete training, waiting a for a couple of hours before eating will slower recovery rate.

### **2.11. Timing of Meals**

Optimal training diet needs to be planned rather than haphazard. In this way the athletes will insure that they are achieving all their nutritional goals. In addition, the timing of food can be important factor in making it all happen- matching their food intake to the times when their body most appreciates it (Burke 1998).

During their athletic season, athlete must keep track of their water intake on daily bases. In addition athletes must weight themselves in the morning and after practice to keep track of their daily body weight fluctuations. Generally, the human body can lose only a maximum of a half pound of fat per day, so, if they found themselves losing several pounds of body weight on a particular day, it is most likely from water loss (ibid).

The athlete's daily time table and their commitments will be unique to apply the correct strategies of optimal training diet. Burke also forwarded some hints for meal timing: spread same food intake over five or six meals and snacks, rather than three large meals. The possible advantages are more even blood glucose levels rather than big peaks and through over the day. This may help to avoid flat spot or afternoon fatigue lower blood fat levels and less likely hood of storing body fat for the same kilojoules load.

- Stimulation of their metabolic rate more meals –better stimulation.
- No need to stuff themselves to eat lots of kilojoules.
- Avoid hunger spots.

- Time athletes their last meal before training or competition so that can exercise comfortably. This may mean 1-2 hours for a light snacks or a liquid meal (low-fat milk smoothie of sustagen sport etc), and up to 3-4 hours for larger or heavier meals.
- Promote recovery after heavy exercise sessions (training or competition) by eating some carbohydrate as soon as possible.
- Having access to food when athletes need it will be an important factor in achieving their nutritional goals.

If athletes live their life on the run they will need to plan ahead. Having a portable food supply with they will have them to eat on the going. Think of some suitable snacks to store at work, in their locker, in their sports bag, or in their car (ibid).

In light of the above, idea, Cretzmeyer et, al. (1974) stated that most athletes have well established habits as to the times their meals are eaten. In contrary most athletes/individuals Omitted to well- established meals. Breakfast is the Omitted most frequently. This omission occurs in many instances because the individual fails to allow sufficient time for the morning routine, including eating breakfast. Well-planned breakfast should contain approximately one-fourth of the total daily calorie requirement and protein allowance.

This indicated that meal planning is an important phase of the training program, and therefore, the basic principles involved should be well-understood by both trainers and coaches so that they are in a position to advise their members and thus reduce nutrition difficulties that may arise (ibid).

## **CHAPTER THREE**

### **3. RESEARCH DESIGN AND METHODOLOGY**

#### **3.1 Research Design**

For the purpose of this study, both the qualitative and quantitative methods of inquiry were employed. This study was employed descriptive survey methods especially census survey research methods, because of this reason all subjects involved in study. So, researcher used this method because survey research method is predominately descriptive.

Survey research is systematically gathering information about a situation, area of interest, a series of events or about people attitude, opinions behaviors, interest or practices (Langhan, 2005).

So researcher used this method because of the purpose characteristics of this study is predominately descriptive. Accordingly, the study has deal with the nutritional practice on an athletic performance in case of Hagerselam junior project athletes in SNNPR in order to mine major factors and suggesting some possible intervention strategies that can be used to enhance the athletic performance.

#### **3.2 The Research Site**

The study has been conducted in the Southern Nation Nationalities and Peoples Region Athletic project especially, Hagerselam special project athletic training center.

Hagerselam special project athletic training center located around Hagersalm Twon of Sidama Zone in SNNPR. From starting 2001 the centre were operating with having 28 junior athletes, two coaches and one technical director. Beside this, the center has consists four food service providers and two guards.

### **3.3 Sample Size and Sampling Techniques**

#### **3.3.1 Sample Size**

In an effort to undertake this study researcher has dispenses to select all populations (28 junior project athletes, two coaches, one technical director and four food service providers). But unfortunately 6 athletes were absent when researcher was arrived the site.

Therefore, the total sample size of the study was 22 (78.6%) athletes' respondents were selected out of 28 (100%) junior athletes', out of this 22 respondents athletes 11 were females and 11 were males. On the other hand, 2 (100%) i.e. one female and one male coaches, one technical director 1 (100%) and 4 (100%) of which (3 male and 1 female) food service providers were included in the sample.

#### **3.3.2 Sampling Technique**

In this study, the researcher used purposive sampling techniques to select sample. This sampling was believed appropriate because the population size was relatively small and the data sought were more of fact based involving experience and current nutritional practice of Hagerselam junior project athletes. With this connection, the researcher believed that the subjects selected for this purpose have better attachment and experiences about area of study than any other project athletes in SNNPR.

Moreover, applying the purposive (non-random method) sampling was believed to be relatively convenient and manageable within the limits of time and resources available and/or accessible for the investigator.

### **3.4 Instruments and Procedures of Data Collection**

In order to collect adequate and reliable data, the researcher employed primary sources like questionnaire, personal observation and interview, which plays great role to get factual information. In addition, secondary source (Document analysis) also has been employed in this study.

### **3.4.1 Instruments of Data Collection**

To get better information the researcher employed triangulation methodology which includes: questionnaire, observation, interview and document analysis in this study.

The researcher developed 15 questions, which includes 12 closed and 3 open ended question for athlete respondents in Amharic and 14 (9 closed and 5 open ended) questions for coaches were prepared in English.

The interview provided a great advantage to connect adequate data to the study. So, researcher designed and employed structured and unstructured interview questions to some selected athletes, technical director and for food service providers based on their experiences.

Moreover, observation is the most appropriate tools to collect data in this study, it require the presence of the researcher in the site. The researcher also tried to observe the athletes while they are in training and at their meals and snacks. As Langan (2005), observation allows researcher do not only hear what participants say, but also see, smell, and touch as they interact with participants.

Therefore researcher used observation to gather depth information and elaborate discussion intimation specific issues to corroborate findings and to triangulate data gather with rest tools.

On the other hand, secondary data were obtained mainly from food menu documents, lost two years result reports in competition and annual plan of training.

### **3.5 Data Collection Procedures**

The researcher followed the following procedures during data gathered.

### **3.5.1 Formation of Questionnaire Items**

Questionnaire items were developed based on the basic questions of this research information sought through this instrument was by and large fact based.

#### **3.5.1.1 Undertaking the pilot Test of the Questionnaires**

Before distributing the finalized questionnaires to the pre-specified participants, it was found necessary to distribute the final draft of questionnaire items to one senior member of the academic staff and two MA second year students of sport science were distributed. The researcher believed that it was appropriate to seek such comments in order to improve the quality, relevance and clarity of the instruments. All of them were returned questionnaires with useful comments.

#### **3.5.1.2 The Examination and Reformation of Questionnaires Items**

Based on comments obtained from the foregoing pilot test, the questionnaire items were reshaped, items were not included previously now included.

#### **3.5.1.3 Distributing the Questionnaires**

Twenty two questionnaires were distributed to the athletes and two questionnaires were distributed to coaches out of those, all 22 questionnaires from athletes and 2 from coaches were properly filled and returned respectively. That means, all the participants returned the questionnaires which indicate that 100% were filled and returned properly. The researcher used a collective (face-to-face) method to gather data. Beside to this questionnaires distributed by providing clear instruction to respondents and also researcher assisted by providing clear information to respondents when they want to get clarification.

### **3.5.2 Conducting Interview**

The interview (structured and unstructured) items, were developed in a similar way in which questionnaire items were developed so as to supplement and/or complement information obtained through the other means, including the other tools.

Additionally, these items were developed in an open ended and closed ended manner. It was done this way for simplicity and flexibility in which participants might feel free in some condition to discuss what they know, practice, feel, without restrictions with this regard, the researcher strongly believed that many aspects of this issue could not be covered in the partial draft interviews items but, rather this initial items could create a stimulation situation in which participants could generate new ideas.

### **3.5.3 Observation**

In order to find the accurate and relevant information observation were employed in this study. Observation can be employed to gather data from participants under natural situation. The researcher designed and developed observation checklists and used narrative and categorizing methods to recording the daily activities of athletes.

Checklist, narrative and categories methods were employed during observation. The researcher used participatory and non-participatory method of observation. Different measuring instruments were used together data like weight kilogram were used to measure athletes weight before and after training and recorded as its.

### **3.5.4 Document Analysis**

An attempt to find out some relevant documents was made to the researcher. So, there is some information gathered from meal plan and their annual training plan. The competition result documents were analyzed and

incorporated on the data to enhance the validity and reliability of the data to this study.

### **3.6 Method of Data Analysis**

In this study both qualitative and quantitative data analysis methods were employed. Based on the basic researcher question, statistical tools such as number and percentages were used to particularly to analyze quantitative data. Percentage where used to explain the personal characteristics of respondents, frequency characteristics of respondents, and frequency rate of respondents. On the other hand, the views of the respondents and documentary sources are taken as they are.

## **CHAPTER FOUR**

### **4. PRESENTATION ANALYSIS AND INTERPRETATION OF DATA**

This chapter of the study deals with the presentation, analysis and interpretation of data that collected through triangulation of different tools of data gathering. Data from respondents were analyzed and interpreted with both quantitative (descriptive and inferential numeric analysis) and qualitative analyses. Two items or information has been treated in this section of study, the background information of the participants and the analysis and interpretation of the data were gathered through questionnaires interview, observation and document analysis. In the data processing numbers after decimal point were rounded off to the nearest unit.

#### **4.1 General Characteristic of the Respondents**

The profile of the athletes and coaches respondents with regarding to their sex, age, years of experience, level of education coaching career covers related to coaching athletics and athletics health problem which were included in the general information of in a part of questionnaire, were summarized and present in the following table1.

**Table 1, General characteristics of athletes and coaches respondent**

General information	Athlete Respondents		Coach Respondents	
	Number	%	Number	%
<b>A. Sex</b>				
Male	11	50	1	50
Female	11	50	1	50
Total	22	100	2	100
<b>B. Age</b>				
14& below	-	-	-	-
15-20	22	100	-	-
21-25	-	-	1	50
26-30	-	-	1	50
31 & above	-	-	-	-
Total	22	100	2	100
<b>C. Years of experiences in coaching/ training years</b>				
Less than 1	5	23	1	50
1-2	11	50	-	-
2-4	6	27	1	50
5 & above	-	-	-	-
Total	22	100	2	100
<b>D. Education level</b>				
Diploma	-	-	1	50
1 <sup>st</sup> Degree	-	-	1	50
2 <sup>nd</sup> Degree	-	-	-	-
Total	-	-	2	100
<b>E. Have you ever taking education related course</b>				
1 <sup>st</sup> level	-	-	-	-
2 <sup>nd</sup> level	-	-	2	100
Not at all	-	-	-	-
Total	-	-	2	100
<b>F. Coaching career in the center</b>				
Full times	-	-	2	100
Part times	-	-	-	-
Others	-	-	-	-
Total	-	-	-	-
<b>G. Have you ever faced health problem</b>				
Yes headache	3	14	-	-
Frequent coughing	1	4	-	-
Stomachache & diaharria	7	32	-	-
Not at all	11	50	-	-
Any other health complex	-	-	-	-
Total	22	100	-	-

As shown in the above table 1, the sex composition of the respondents that, 11 (50%) of the athletes and 1 (50%) of the coach were male similarly 11 (50%) of the athletes and 1 (50%) coach respondents were females. As one can read from the above table, athletes and coaches respondents half (50%) were male and half (50%) were female respectively.

In the case of age, total 22 (100%), of the athlete respondents were obtained between 15-20 years of age and, 1 (50%) of the coach respondent was fall in range of 21-25 years the remains 1 (50%) of coach was between 26-30 years.

Hence one can deduce from this analysis, almost all athletes were found at similar age categories of 15-20 years. Whereas 1 (50%) of coach fall between 21-25 and 1 (50%) of coach were between 26-30 years of ages.

As far as the experience of training and coaching service year 5 (23%) of the athlete and 1 (50%) of the coach respondents were have less than one year experiences of training and coaching respectively. While 11 (50%) of the athletes respondents were 1-2 years experience of training in the center, whereas 6 (27%) of the athletes and 1 (50%) of the coach respondents have three years training and coaching experience respectively. Beside to this, 2 (100%) of coaches respondents 1 (50%) of coach diploma holder and the remaining 1 (50%) was first degree holder.

From the analysis made, one can infer that the majority of the athletes respondents where one to two years experience, where as half 1 (50%) of the coach respondent has 3-4 years services in the coaching in the center.

Accordingly, 2 (100%) of the coaches were took second level of coaching to athletics. Similarly 2 (100%) of the coaches were full times in their career of in the center.

As indicated in the above analysis, the 2 (100%) coach respondents were took level two course of coaching athletics and they also full time in their career in the center.

According to the information given in table 1, concerning about health problems, from of total 22 (100%) athlete respondents, 3 (14%) and 1 (4%) of the athletes were faced sometimes headache and frequent coughing respectively. Whereas 7 (32%) of the respondents were faced frequently stomachache and diaharria. But the rest of 11 (50%) athletes were not faced any health problems in lives in the centers.

As result of this, we can conclude from the information gathered and analyzed concerns about health complex of athlete respondents, out of total 22 (100%) of the athletes, 11(50%) of the respondents were faced health problems like headache, stomachache and diaharria and frequent cough.

This results in the harmony with the interview of the technical director asserted most of the athletes face health complex, especially headache, continuous coughing, stomachache and diaharria. This may be related to dietary intake more specifically related to water. In line to this, also researcher observed more than three athletes were faced strong stomach discomfort and diaharria where gathered data with observation. So, this may be the result of inadequate intake of dietary and fluid both on training and non training days.

Table 2, the response obtained from athlete about eating different kinds of food most frequently.

No	Items	Responses	Number	%
1	How often do you eat a balanced diet every day?	Always	7	32
		Sometimes	13	59
		Rarely	2	9
		Total	22	100
2	What kinds of food do you eat most frequently in your daily meals and snacks?	Carbohydrate	7	32
		Protein	14	64
		Fats	1	4
		Any other	-	-
		Total	22	100
3	What is your most favorite food? That you like to eat with interest?	Carbohydrates	10	45
		Fat	-	-
		Protein	12	55
		Beverage and fibres	-	-
		Other	-	-
		Total	22	100

As shown in item 1, of table 2, the majority 13 (59%) of the athletes responded that they were have/eat a balanced diet sometime in every day to provide their body with all essential nutrients. Whereas the 7(32%) of the athlete respondents were replied that they were eat every day a balanced diet. The rest 2(9%) of the athletes were replied that they were had rarely a balanced diet.

Inline to this interview question forwarded to athletes implies as follows:

Their meals contain very less amount of fibers in their daily meals.

Based on this information above item 1, one can infer that, the majority of athletes were didn't consume a balanced diet in every day meals and snacks.

This result is harmony with the observation results replied that athletes didn't had all essential nutrients in their daily meals and snacks. So, this leads athletes to health problem and impairs their performance due to lack of a balanced diet that requires for daily body function and requirements for training.

Therefore, athletes must try to get or have a balanced diet every day to fulfill requirements of the nutrients for health body and to improve their performance.

This interpretation was similar by idea with Special Olympics coaching guide (2003), "Athletes must take in all the nutrients they require to be health and strong in training".

On the same table item 2, 14 (64%) of the athlete respondents replied that they were ate protein most frequently in their daily meals and snacks. The remained, 7 (32 %) and 1 (4%) of the athletes were ate daily carbohydrate and fat respectively.

Hence one can deduce form this analysis, most athletes were often ate protein in their daily meals and snacks. In line to this, the results of observation conducted by researcher support this idea that means athletes were ate most frequently protein in their daily meal and snacks. This may affect the athlete's performance by inadequate energy balance that most portion of meal contains protein which contributes less energy than carbohydrate and fat. In addition to this large protein intake dehydration of athletes according to Nayab (2011) "intake of very high protein diet have been associated with a possible increased risk kidney disease. An excessive consumption of protein may result in an increase in the amount of protein begin stored as a fat. This would lead to an increase in the amount of urea being created in the urine. An increased and excretion may decrease the level of hydration and increase the risk of dehydration".

On the same table item number 3, 10 (45%) of the athletes repealed that they were a eat carbohydrate with their interest. Whereas 12 (55%) of the athletes responded that they were ate proteins.

One deduce from this information, majority of athletes were choice protein to ate and for few athletes is first choice is carbohydrate.

Therefore appropriate amount of protein consumption based on individual body size, duration and intensity of training most advisable to athletes. Otherwise, the excess intake proteins impaired the athlete's performance by increasing dehydration.

Table 3, the view or believes of caches and athletes on dietary intake and athletic performance.

No	Item	Responses	Respondents			
			Athletes		Coaches	
			No	%	No	%
4	Do you think an adequate dietary intake in terms of quantity and quality before, during and after training or compaction significantly influences athletic performance?	Yes	16	73	2	100
		No	6	27	-	-
		Uncertain	-	-	-	-
		Total	22	100	2	100

As show in item 4 of tables 3, 16 (73%) of the athlete respondents and 2 (100%) of the coach respondents were revealed that, an adequate dietary intake in terms of quality and quantity before, during and after training or competition influences athletic performance. While 6 (27%) of the athletes were replied that there were no any contribution of dietary intake before during and after training on performance.

Based on this information obtained from above table 3 one can conclude that, the dietary intake around training or competition can influence the performance of the training. Therefore, athletes and coaches should give great attention to proper dietary and fluid intake in quantity and quality before during and after training to enhance exercise as well as athletic performance in specific even

Table 4, athletes and coach response that focused in scientific and suitability of nutritional practices strategies.

No	Item	Responses	Respondents			
			Athletes		Coaches	
			No	%	No	%
5	Do you appreciate and follow scientific and suitable nutritional practice strategies of dietary intake to ensure proper amount, kinds of food and fluid with appropriate time before, during and after training or competition?	Yes	6	27	-	-
		No	14	64	2	100
		Uncertain	2	9	-	-
		Total	22	100	2	100
6	Do you promote recovery between training sessions with nutrition practice that will rapidly replace fluid and fuel lost, and allows the body to recover and adapt to training load?	Yes	-	-	1	50
		No	22	100	1	50
		Do not know	-	-	-	-
		Total	22	100	2	100

As indicated in table 4 item 5, 14 (64%) of the athletes and 2 (100%) of the coaches respondents replied that there were not any scientific and suitable nutritional practices strategy they were applied to ensure the dietary intake in proper amount and kinds with appropriate time around training or competition. In the other hand, 6 (27 %) of the athletic respondents reveal that they were appreciate and follow suitable strategy of dietary intake around training, where as 2 (9%) of the respondents were uncertain about nutritional practice. This implies that there were all coaches and majority of athletes didn't appreciate and follow the scientific and suitable nutrition practice strategy of dietary intake to ensure nutrient requirements of the body with appropriate time before, during and after the training or competition.

Regarding to item number 6 in the same table all 22 (100%) of the athletes and 1 (50%) of the coach were reported that they were not promote the recovery between training session with nutrition practice that will rapidly replace fluid and energy expanded lost which allow the body to recovery and adapt to training load. While 1 (50%) of the coach respondents was responded that he promote recovery between training to enhance recovery time.

Consequently, one can infer from this fact that, all athletes and one coach were didn't promote recovery between training session with nutrition practice, whereas only one coach might encourage the recovery between training sessions that will rapidly replace fluid and fuel lost from the body and allows the body to recovery and adapt to training load but the reality far from his responses. Information gathered through the observation revealed, neither of the coaches nor athletes didn't promote the recovery with nutrition practice between training sessions of intensive exercise.

The prolonged and hard exercises is associated with an increased body temperature, a decrease in body water content due to sweat losses and a fall in the body's live rand muscles glycogen stores. All of this impaired performance by reducing exercise capacity (Maughan and Burke, 2002).

Therefore the coaches and athletes must promote recovery between hard training with nutrition practice, which has potential to improve performance of athletes by delay on set of fatigue and rapid replace the fluid loss from the body through sweat and others.

Tables 5, Athletes' responses concerning selection of foods and fluid intake around training.

No	Item	Responses	Athlete Respondents	
			No	%
7	What kinds of food do you select and eat most often immediately after heavy exercise session of training?	High glycemic carbohydrates	3	14
		Low glycomic carbohydrate	7	32
		Protein	-	-
		Fats	-	-
		Any kinds of food without solution	12	54
		Total	22	100
		8	When you eat breakfast, on the day of training were conducted early morning?	Before training
After training	19	86		
Total	22	100		

As indicated in table 5, item 7 the 12(54%) of the athletes replied that they were ate any kind of food available without distinguish, where as 7(32%) and 3 (14%) of the athletes were select and have low glyceimic carbohydrate and high glyceimic carbohydrates respectively.

This implies that the majority of the athletes didn't select to have meals immediately after heavy exercise. They had any food without giving attention to the kinds of food.

The observation were employed by the researcher, supports this idea, replied that, the Hagerselam junior athletes have no experience on selection and intake of food and fluid immediately after completing intensive training. Also, observation result shows that athletes were ate fat, protein and carbohydrate foods without selection of appropriate foods to speed up recovery. This shows that the athletes may lack awareness or less experienced in selection and intake of diet and fluid in appropriate time to replace the depleted glycogen and water loss from the body during training. This is may be one problem of many

athletes faced in dietary intake that leads to required 24 hours to recovery from fatigue.

On the same table, item number 8, 19(86%) of the athletes were replied that, when training was conducted early morning they had breakfast after training. In contrary 3(14%) of the athletes were replied that they had a breakfast before training.

From this result, one can infer that the majority of athletes perform training without having breakfast in morning session of training. Data gathered during observations highly support this information, which revealed that almost all athletes were did training without having breakfast in early morning. This is the results of proper training program and inflexible daily meals and snacks menu. According to Nayab (2011), breakfast form a critical component in the athletes meal plan. A balanced breakfast provides significant amount of calories and other nutrients and prevents mid- morning hunger. Skipping breakfast on the other hand causes hypoglycemia, leading to weakness.

So, combination of good eating with good training and conditioning program makes a successful athlete.

Table 6, athletes' responses concerning about knowledge and access to select and match food in their meals and snacks.

No	Item	Responses	Athlete Respondents	
			No	%
9	How do you evaluate the access or opportunity to select mix and match foods at Your meals and snacks at possible eating times based up on your demands?	High	5	23
		Moderate	15	73
		Low	2	4
		Total	22	100
10	How much do you have awareness or knowledge about food choices, amount and composition of different foods in your meals and snacks based on your age, body size and intensity and duration of training?	Very good	2	9
		Good	8	36
		Poor	12	55
		Total	22	100

As the indicated in table 6, item 9, 16(73%) of the athletes replied that they have low opportunity to select mix and match foods in their meal and snacks at possible eating times. Whereas, 1(4%) of the athlete has moderate opportunity to select, mix and match their meals. The remaining 5 (23%) of the athletes were replied that they have high access to get and select foods in their meal and snacks at possible eating times to fulfill their needs and energy demands of training.

Based on the information analyzed above, one can conclude that the majority of the Hagerselam junior athletes have low access or opportunity to select, mix and match foods in their meals and snacks at possible eating times.

The data gathered through observation also revealed that Hagerselam junior athletes have less access to select, mix and match foods at their meals and snack whenever they want to eat. This may be the lack of food availability around training center, limited food service in their center and may lack of money to buy and to use required foods. This may lead them to take inadequate amount and kind of foods in their meal menu.

On the same table, in item 10, 2 (9%) of the respondents were responded that their awareness to food choice, amount and composition of different foods very high. Whereas, 12 (55%) of the athletes- replied that they were poor in knowledge about the choice and composition of foods in their meals and snacks in relation to their age, body size and intensity of training. But the 8 (36%) of the Hagerselam junior athletes were equipped with good knowledge concerning to food selection, amount and composition of their meals and snacks. As hence, one can deduce from this analysis, the majority of the athletes had little knowledge about the choices and composition of foods in meals and snacks by considering of their age, body size and intensity and duration of the exercise or training, but a few athletes were well awarded about this issue. The lack of good awareness about optimal training diets, may in force athletes to inadequate dietary intake, which directly affects the exercise performance of the most athletes. Thus, finally leads to decrease in performance.

In line to this, burke (1998) started that many athletes follow nutrition practices that may prevent them from reaching their goal of optimal performance. The lack of practical nutrition knowledge and skills are the main factors that contribute to improper dietary intake.

Therefore, all athletes must give great attention to knowledge and skills of nutritional practice in combination to training program which plays great role in taking appropriate diets to enhance athletic performance.

Table 7, Response of athletes concerning protein and water consumption.

No	Item	Responses	Athlete Respondents	
			No	%
11	How often do you eat a variety of plant protein every day?	Always	-	-
		Sometimes	7	32
		Rarely	15	68
		Total	22	100
12	How often do you drink water during prolong training that lasts more than 90 minutes	Always	1	4
		Sometimes	3	14
		Rarely	18	82
		Total	22	100

As shown in item 11, of table 7, 7 (32%) of the athlete respondents were replied that they had sometimes a variety of plant proteins in their meals and snacks. Whereas 15(68%) of the athletes replied that they had have a variety of plant protein were rare.

According to the information given in table 7, one can conclude that, almost all athletes had sometimes or rarely a variety of plant proteins.

Data gathered through observation reveals that, the Hagerselam junior athletes were ate very less or insignificant of plant proteins in their meals and snacks. This may greatly affect the vegan athletes, those who don't eat a animal proteins. The vegetarian athletes must have a variety of plant proteins in their meals and snacks to compensate animal proteins.

On the same table 7, item 12, only 1 (4%) of the athlete was replied that he/she drink water always when events last more than 90 minutes. While 3 (14%) of the athletes responded that they were drink water sometimes during prolonged training, whereas the remaining majority of 18 (82%) of the respondents were answered that they were drink water rarely in training that lasts more than 90 minutes.

From the analysis made above, one can infer that the majority of the athletes were very less experienced in drinking water in prolonged training. In line to this, the data gathered through personal observation, show that there were

none of the athletes experienced in drink water in training. In addition to this, researcher was conducted interview to athletes were as follows:

- When you drink water whether in training or off training in the whole days?
- How much water do you drink per day?

The above two interview questions were forwarded to Hagerselam junior project athletes the majority said that we drink water when we feel thirst whenever, unless we do not have interest to drink water. In light to this, observation result also reveals that they were not interest to drink water without feel of thirst. They were drunken water, special sport drinks like soft drinks only on meals and snacks times.

Also the majority of athletes said that for questions how much water do you think per day? We drink most of the time  $\frac{1}{2}$  to 1 liter per day.

Data gathered through observation check list indicates that most athletes were did not drink more than 1 liters water per day.

From above analysis any one can understood that the experience of the Hagerselam junior athletes have less water consumption habit.

Also, they drink less than 1 liter per day, which may not be enough to daily requirements. This all may lead athletes to dehydration.

When the athletes feel thirst, they were already dehydrated, which directly impaired athletes performance.

Therefore, athletes and coaches must give great attention to develop good habits of water intake before, during and after training and the whole day, which contributes to develop good performance by increasing exercise performance.

Table 8, response of coaches concerning athletic training.

No	Item	Responses	Coaches respondent	
			No	%
7	How many days do you provide training to your athletes per week?	1-2	-	-
		3-4	-	-
		5-6	2	100
		Total	2	100
8	To what total duration of time in average your athletes performer training per day?	1-2 hours	1	50
		2-3 hours	1	50
		3-4 hours	-	-
		5 and above	-	-
		Total	2	100
9	What method of training do you follow most frequently in training?	Circuit	-	-
		continuous	-	-
		Interval	-	-
		Fartlek	-	-
		Almost all	2	100
		Total	2	100
10	When you provide training most often to your athletes?	Morning	-	-
		Afternoon	-	-
		In both alternatively	2	100
		No specific time	-	-
		Total	2	100

As indicated in the above table 8, item number 7, 2 (100 %) of the coaches replied that they were provide training 5-6 days per week to their athletes.

As one can see the analysis of the above table 8, item 7, all of the coaches were provided training 5-6 days per week. Data gathered through observation, replied that the athletes were in the Hagerslam junior project center perform training per day. In addition to this, they did more than one session per days in early morning and afternoon training sessions. In line to this, The Thompson (2009) started that: as athletes mature and gain experience they are able to tolerate higher training load. They develop gradually over a number of years to where they can carry out sessions on 6-7 days a week. So, this indicates that Hagersleam junior project athletes were followed correct training sessions per week.

As indicated in table 8, item number 8, 1(50%) of the coach was replied that the total time of training in average is 1-2 hours. Whereas, 1(50%) of the coach responded that the total duration of training time is ranged 2-3 hours.

One can conclude that the training time in total varies for two coaches. This may be based on the intensity and durations of the training load.

The researcher employed interview to one experienced coach about this issue: She said that the total duration of training is varies for short distance, middle distance and long distance runners, she explained in detail as follows:

The long distance and middle distance runners' were spent 2-3hours in training per day. While short distance, jumpers and throwers were did training intensively from 1-2 hours per week.

So, this indicates that the short distance runners did training intensively 1-2 hours per day. Whereas middle distance and long distance runners have followed the same training routine, because of both of them require endurances training.

Regarding item number 9, in the above table 8, 2(100%) of the coaches replied that they were follow the different methods of training. Almost they have followed all the methods of training based on the goal of each athlete and characteristics of each event.

From the above analysis one can infer that the Hargerselam junior athletes and coaches have been employed all methods of training in different training sessions to achieved their goals.

As shown in table 8 item number 10, all of 2 (100%) of the coaches responded that they were conduct training alternatively in both morning and in afternoon. For this, one can understood that Hargerselam junior project athletes and coaches were conduct training alternatively in morning and afternoon. There was no any fixed training routine to follow consistently. Information gathered through observation also strengthens this idea.

#### **4.2. Coaches Open-ended questions interpretation**

The responses of coaches to open ended questions are:

1) What kinds and proportions of food do you appreciate to your athletes' to achieve their nutritional goal to fulfill energy and nutrient requirement before, during and after competition and training day?

Their responses were summarized as follows:

They didn't have any attention to optimal training nutrition practice with specified time, kinds and proportion of carbohydrate fat and protein. They were simply advise their athletes' to take in different nutrients in general and none of the coaches were explained it in proportion of foodstuffs requirements in training and off training.

As one can see the above summary of responses, it's possible to conclude that, the coaches were rarely attempt to advise athletes' to consume the carbohydrate, fat and protein in correct proportions including other nutrient. Therefore this is one factor that affects the athletes' normal dietary and fluid intake around training. This improper food and fluid consumption directly or indirectly affects athletic performance.

Therefore, the coaches and athletes must give great attention to foods and fluid consumption in kinds and proportions of different foods around the training at rest day.

2) How do you assess and manage your athletes' diet and fluid intake to advise and recommend the appropriate diet and fluid at any required time? They explained as follows:

The project were already designed meal plan, that athletes' were used were old. They didn't more assess their diet and fluid requirements. So, this indicates that there is no any measurement taken to identify and advise the required amount of food and fluid at any required time to athletes. In light of this the data gathered through observation shows that there is established meal plan at the beginning of training in the center. This may be one problem that athletes' were faced in the center i.e. inability to consume appropriate foods and fluid at any required time. If the athletes' didn't consume the required amount and

kinds of food at any time that leads to loss their weight and impair their ability to continue the given exercise. This finally leads to decrements of fitness level and athletic performance.

Because of this reason, coaches and athletes' must assess the dietary and fluid intake of each athlete to establish their individual caloric and fluid requirements of each individual.

3) Do you provide to your athletes the update and in-depth information in nutrition practice and exercise physiology that athletes' need to make decision? Their explanations were summarized as follows:

They were advice athletes' sometimes about water intake and food consumption as a whole without specifying the kind proportion of food in depth. The coaches were didn't tried to provide any updated information for athletes' knowledge and awareness about optimal training nutrition practice in detail around and day off training.

So, coaches have to attempt aware about nutritional practice is not satisfied. This may be categorized as one factor for shortage of nutritional practice. If an athletes' lack awareness on nutritional practice, which may lead them to inadequate diet and fluid intake, which may result impaired an exercise performance.

Therefore, coaches should be aware and try to provide awareness that athletes' eating and drinking patterns will influence how they can train and whether they are able to compete at their best. In light of this, Thompson (2009), revealed that "coaches should work with athletes' to develop healthy diets where they are individually aware of their personal nutrition goals and of how they can select their nutrition to meet those goals". So, well informed athletes about nutrition practice in well manner can chose and consume a well diet. A well chosen diet offers many benefits to all athletes', regardless of event, gender, age level of competition includes optimal gains from the training programme and enhances recovery time.

4) Is there any factors that affect the optimal nutrition practice of your project athletes' around training and off day?

Their responses were summarized as follows:

The attitudes of athletes' towards taking of foods and fluids were not satisfactory. Their reasons are fear, anxiety and stress during competition or training. Beside to this, there were no fruits and vegetables foods available. The data's gathered from observation indicates that, there were no hotels, restaurants and cafeteria around the center that provides appropriate food services which may be cause the shortage of alternative food menus. In addition to this most athletes' lack about food selection and consumption and fixed menu plan etc. this all are may be measure factors of the center which hinders the optimal nutritional practice during training and off day.

Therefore coaches and athletes' have to give attention to overcome these problems to make the training successful and effective.

5) What do suggest in minimizing unsound nutritional practice of this center project athletes'?

Their responses were taken as follows:

- By conducting awareness program to our athletes' by inviting nutritional specialists.
- Designing and providing awareness on nutritional practice to coaches and athletes'.
- By developing relationship with neighboring universities and colleges to share experiences on exercise and nutritional practice specifically with sport science programs/departments. Because they believed that the athletes' more eager to listen the ideas of lecturers than their coaches.
- SNNPR Athletics Federation must support the project center by providing sufficient budget to fulfill the required nutrients.

### **4.3. Athletes' response for open-ended question**

1) What kind and amount of foods do you consume when the following time is left to start training or competition? Discuss briefly on the following points:

- I. Less than 1 hour left for training;
- II. 1 to 2 hours left for training;
- III. 3 to 4 hours left for training.

Their responses were summarized as follows:

Majority athletes' replied that, they are not concerned with time to consume foods before training and they consume at the time they get or when they feel hunger, but the minority athletes' replied that they had bread with tea, pasta and rice when the time is less than one hour. When the time 1 to 2 hours left for training they had pasta, cooked sheep meat with enjera. Also when the time 3 to 4 left for training they had enjera with cooked cow meat and macaroni. As Elizabet (1998), eating before exercise is something only the athlete can determine based up on experiences, but some general guidelines includes a solid meal 4hrs before exercise, a snacks or a high carbohydrate energy drink 2 to 3hrs before exercise, and fluid replacement 1hr before exercise.

#### **1hr or less before training or competition**

- ✓ Fresh fruit such as apples, watermelon, peaches, grapes or oranges and/or
- ✓ Energy gels
- ✓ Up to one 1and half cups of a sport drinks

#### **2 to 3hrs before training or competition**

- ✓ Fresh fruits
- ✓ Bread, bagels, pasta
- ✓ Yogurt
- ✓ Water

#### **3 to 4hrs before training or competition**

- ✓ Fresh fruit
- ✓ Bread, bagels
- ✓ Pasta with tomato sauce
- ✓ Baked potatoes
- ✓ Energy bar
- ✓ Cereal with milk

- ✓ Yogurt
- ✓ Bread with a bite of peanut butter, lean meat, or cheese
- ✓ water

To sum-up, most athletes' have less awareness to select and consume the appropriate foods and fluid with the time specifications.

2) How do you evaluate your current meal plan/menu in terms of success in including a balanced athlete diet with variety and moderation in connection with time of training program?

Their responses were organized as follows:

Almost all athletes' were responded the meal plan that they follows were overloaded with animal protein, cereals (especially enjera with woit) and dairy products. Next to this pasta, sport drinks (coke) and rice were available in their meal plan.

From the above information one can infer that their meal plan/menu was overloaded only with specific foods. The data collected with observation also reveal that their meal plan were not spread the intake evenly throughout the day. It was resorted three large meals and one snack. Also their meals and snack were not including a variety of nutrients.

In addition to the above question the researcher employed interview for one coach. The interviews were about their meal plan success in terms of contents and extents to provide sufficient energy and other essential nutrient to athletes.

The response of the coach is:

She said "we have been prepared the current meal plan without involvement/guidance dieticians, for this reason the meal plan may not include all the required nutrients for our athletes". By considering her responses the researcher adds some questions, which were in the future in what way do you want to improve your meal menu for your athletes in the future if the conditions were fulfilled to you? Her responses implies that when all the conditions are fulfilled for us we want to modify our meal plan menu and we increases the intensity and duration by considering calorie in and out that enhances our athletes performance.

Finally the researcher interviewed about her suggestion/opinion to solutions for the problems (the dietary and fluids intake around training) based on time, kind and amount of nutrients). She replied as:

- Conducting researches on nutritional practice and implementing the findings of the research practically.
- Sharing experiences with other successful athletics projects concerning on nutritional practice.
- Using latest technologies to get updated information on nutrition for athletics and performance enhancing method.
- Inviting role model athlete as guest and sharing his/her experiences.

As stated in (Special Olympics coaching guide 2003), athletes must take in all the nutrients they require to be health and strong in training or competition.

In addition to this, Layab (2011) states a successful meal plan for athlete is not just loading the menu with the required athletes' nutrition. The key to success rather lies in a balanced athlete diet with variety in menu, and moderation. Therefore, the right mix of nutrients and fluids is fundamental to any successful athletic program. Frequent meals rich in carbohydrate, moderate in fat adequate in protein provide the winning formula. Small meals increase the energy absorption levels and prevent over eating. Three small meals interposed with three snacks form the optimal eating schedule. So the right everyday eating plan athletes commitment to training will be fully rewarded.

3) Is your food mostly fresh? And how do you prepare your food mostly? The athlete's response for this question was summarized as follows: the majority of athletes had fresh food most frequently, but they didn't prepare their food instead food service providers prepare the food and supplies for them. In addition the researcher provides question for food service provider on how they prepare and supplies for athletes; they were prepare foods mostly by cooking and kept in refresh area. Also they respond for sanitations of during preparation and saving, they always keep clean food materials and prepare in well manner.

## **CHAPTER FIVE**

### **5. SUMMARY, CONCLUSION AND RECOMMENDATION**

This chapter presents an overview of the study results, and it deals with summary of the findings, conclusion drawn from the findings and the possible recommendations were listed in this section of the study

#### **5.1 summary of finding**

The main purpose of this study was to investigate the effects of the dietary and fluid intake before, during and after training on athletics performance with specific reference to Hagerasalam junior project athletic center of SNNNPR. This research mainly focuses on Hagerasalam junior project athletes to examine their dietary and fluid intake experiences before, during and after training and their performance.

In order to achieve the purpose of the study the following basic research questions were answered:

- ❖ Does timing, kind and amount of dietary and fluid intake around training or competition influence athletics performance?
- ❖ What are the Hagerasalam junior project athletes' experiences in optimal nutrition practice and problems they encountered on training?
- ❖ What are the major factors contributes to the unsound nutritional practice of Hagerasalam junior project athletes?
- ❖ What are the correct and suitable scientific guidelines of dietary and fluid intake by timing, kind and amount of foods before, during and after training?
- ❖ What should be done to minimize problems of nutritional practice around training to enhance athletic performance?

In this study the researcher used descriptive survey method, especially census survey. The purposive sampling technique under non probability sampling method also employed in this study.

The subjects of this study were 22 Hagerasalam junior project athletes, of this 11 were males and the rest 11 were females. Also two coaches were included in the sample. For further information one technical director and four food service providers were included in the study.

In order to collect the adequate and reliable data the researcher used triangulation methods which include questioners (closed-ended and open-ended), personal observation, (structured and unstructured interview) and document analysis were employed as data gathering tools.

In attempt to address the basic research questions different literatures and documents were referred. Becoming an elite athlete requires good genes, good training, conditioning and a sensible diet. Optimal nutrition is essential for peak performance.

Nutritional misinformation can do as much harm to the ambitious, athletes as good nutrition can help. Now more than ever athletes need accurate sport nutrition information. By supporting this points William and Wilkins (2011) elaborates as optimal nutrition is an integral part of peak performance while an inadequate diet and lack of fuel can limit an athlete's potential for maximum performance. Unfortunately, there is much more misinformation available regarding a proper diet for athletes.

Therefore, most often an evaluation and modification of current dietary intake is needed to help to maximize peak performance. Because of this purpose the researcher conducted this study in Hagerasalam training center athletes. This may be the problem that hinders them from achieving of their goals.

After data gathered through triangulation method to enriched, the information were analyzed and interpreted with both quantitative and qualitative method. The findings of the study were summarized as follows:

- The majority 13 (59%) of the athletes were replied that they were not had a balanced diet most often in their daily meals and snacks. So, this may

be one factor that hinders the athletes training goals and their athletics performance. In strengthening this paragraph Burke (1998), *nutritional variety will provide plenty of potential for good combinations at a meal. Eating a wide variety of foods is a good way to keep athletes intake of all food components within healthy level.*

- The large number of athlete respondents responded that they were ate protein food most frequently than other major foods in their meals and snacks. In line to this, Nayab (2011) revealed that, *an excessive conception protein may result in an increase in the amount protein begin stored as a fat. This would lead to an increase in the amount of urea being excreted in the urine. This results by impaired of athletic performance by increasing dehydration. Based on an athlete's individual body size, age, gender, duration and intensity of exercise appropriate amount of protein consumption is most acceptable.*
- Almost all coaches and majority of the athletes were replied that adequate dietary intake in terms of quality and quantity before, during and after training are influences the athletes' performance.
- The majority of athletes and all coaches were responded that they were not used modern and scientific strategy of nutritional practice to ensure the food and fluid intake in kind and amount with appropriate time.
- All athletes' and coaches were forwarded that they didn't promote any recovery between training sessions and at the end of the training program with nutritional practices. This may causes athletes tiredness early and required longer time for recovery, which results in reducing athletic performance.
- Responses of the athletes with respect to the having breakfast, 19 (86%) of the respondents were mentioned that, they perform training without having breakfast when training was conducted at early morning. Therefore, this indicates the Hagerasalam project athletes were performed with empty stomach. This may be one factor that affects their performance. According to Nayab (2011), *Breakfast form a critical*

*component in the athletic meal plans. A balanced breakfast provides significant amount of calories and other nutrients, and prevent mid-morning hungry. Escaping breakfast causes hypoglycemia, leading to weakness in performance.*

- Majority of athletes were replied that there were no access or opportunity to choose, mix and match different foods in their meals and snacks and also they have less awareness about choice and mix of foods to match with their need and calorie required for training. Moreover, they have low awareness on composition of food stuffs and other nutrients in their meals and snacks. In light to this, Burke (1998), revealed *many athletes follow nutrition practices that may prevent them from reaching their goal of optimal performance.* To overcome this problem the athletes must select, mix and match different content of food to meet their interest and to cop-up with training difficulty. The data gathered and interoperated showed that the less availability of food kind to select and mix to match their needs. Beside this, athletes lack awareness on nutritional practices.
- Responses of athletes with respect to having a variety plant proteins diverging. Accordingly, almost all athletes had sometimes a variety of plant protein in their meals and snacks. In other hand, the majority of athletes have very less experience in drinking water in training and off. Moreover, the athletes were drink water when they feel thirst. Also they were drink water in average only half to one liter water per day. Therefore, athletes in this center have less habit of drinking more water before, during and after training.
- The coaches were provided training from 5 to 6 days per week with one to four total duration times, by applying all essential methods of training alternatively (morning and afternoon) based on weather conditions.
- The responses of coaches were very less concerning the degree of appreciations of their athletes to intake different kinds and proportions of food in around training with specified time. Beside this, there were no any assessment techniques and management strategies that taken by coaches to facilitate athletes dietary and fluid intake in kind and amount

around training. Furthermore, the responses of coaches' respect to providing update information about optimal dietary practice replied that they provide information about dietary and fluid intake was very less.

- The responses of athletes concerning the current meal plan, almost all athletes replied that their meal plan is overloaded with specific kinds of food, it does not include all essential nutrients, for example fruit and vegetables foods were very less or insignificant in their meals and snacks. Therefore, the meal plan the Hagerseelam project athlete's follows were not satisfactory. In addition, majority of athletes were not following time specification to intake any kinds of food before the beginning of training.
- There are some factors which were identified by the respondents, those are: attitude of the athletes towards food intakes, anxiety and stress of competition or training, less availability of food in kind around their residence, lack of awareness in athletes on nutritional practices, less competent of food service provider around the woreda.

## **5.2 Conclusion**

In as much as the data obtained from the sources were mention earlier and the means employed to collect them to undertake the survey research with respect to the nutritional practice in the Hagerselam project junior athletes in the SNNPR and the method employed to present and analyze these data are valid, it is safe and defensible to draw the following conclusions based upon the foregoing findings.

Based on the major findings presented above the following conclusions were made (draw).

- With respect to the relevance of having a balanced diet; Hagerselam junior project athletes do not eat a balanced diet most often in their meals and snacks; they eat most frequently proteins in their meals and snacks.

- All coaches and majority athletes believe that an adequate dietary and fluid intake in terms of quality and quantity before during and after training influences athletics performance.
- The Hagerselam athletic training center coaches and athletes do not use/follow modern and scientific strategies in optimal nutritional practice which helps to improve performance.
- All coaches and athletes do not promote any recovery between training sessions and at the end of heavy exercise with nutritional practice which helps athletes' ability continue training without fatigue and speed up recovery of athletes in the end of training.
- The majority of the athletes in Hagerselam project athletic training center, performed training without having breakfast in morning program.
- Regarding the access or opportunity to select, mix and match foods, the Hagerselam junior project athletes have less opportunity to choose, mix and match in their meals and snacks. Beside to this they also lack awareness about, choices and mix of various nutrients to match with their needs and to fulfill the caloric requirement of training.
- The meal plan of the Hagerselam project junior athletes contain more animal protein than appreciating of various plant proteins.
- The training conduct 5-6 days per week with various 1-4 hours total duration and employ all methods of training by alternatively morning and afternoon session based on weather conditions.
- In regard to appreciate and provision of coaches in providing update knowledge to athletes in dietary intake is insignificant. Beside to this, there is no any assessment that the coaches take to facilitate and improve dietary and fluid intake around training based on their body weight, age and characteristics of athletic events.
- There are some factors that obstacles the nutritional practices of the center are: lack of available food around eater, less competent to provide good food service in the center, lack of knowledge or experience of the athletes

on selection and mix and match essential food; less attention of coaches to nutritional practice, attitude of athletes towards different foods, anxiety and stress of the athletes on training, insufficient budget allocation by the Regional Athletic Federation less satisfactory meal plan, lack of athletes interest in fluid intake around training and out off training. Weak schedule of training program and meals and snacks times.

### **5.3 Recommendations**

Based on the findings obtained and the conclusions draw from the study the following recommendations are forwarded.

- A vital and often neglected, ingredient to a successful training porgramme is regulated diet. Inadequate diet and lack of fuel in the body can limit an athlete's potential for maximum performance. In order to achieve peak performance athletes must enjoy or have a wide variety of foods. A health and balanced diet is that maintains an athlete's energy balance and nutrient balance which create healthy body which performs better and improve performance. For this main purpose athletes in this center must eat a lot of different kinds of food such as: Eat most potatoes, rice, mealiest noodles, cereals maize, meal juice, fruit, legumes, bread, pasta; and moderately eat: Yoghurt, chicken, meat, cheese, eggs, milk, fish and nuts, whereas eat least fatty foods, oils, sugar and alcohol fats.
- There is no any doubt that what an athlete eats and drinks can affect health, substrate availability during exercise, recovery time after exercise and ultimately exercise performance. Therefore, the Hagoreselam athletes must try to consume adequate food and fluid before, during and after exercise, which can help them to maintain blood glucose, glycogen stores in muscle and livers levels during exercise, maximize exercise performances and improve recovery time.
- In order to make the training programme effective and successful in this project SNNPR Athletic Federation, coaches and other concerned bodies should create the opportunity or access of foods and fluids availability in

the center for athletes which help to increase the chance of getting all essential nutrients in to mix and match with their individual needs and with demands of training.

- The coaches should provide awareness to athletes on the nutritional practice especially in selection, mixing and matching different kinds of food and fluids to consume before, during, and after training. In addition to this, coaches in cooperation with athletes must assess or experiment with type, timing and amount of food that works best for each individual of dietary and fluid intake requirements based on his/her needs and to fulfill the demands of exercise.
- Skipping breakfast causes hypoglycemia leading to weakness. In order to make a successful athletes, athletes and coaches should give great attention to have appropriately all their meals and snacks at time, also coaches should provide update information about value of having each meal and snacks at time.
- Any level of dehydration impairs the performance of prolonged aerobic exercises, more specifically, the effect become significant when fluid losses exceed 2 percent of body weight. Dehydration also affects mental functioning- decision-making. Concentration and, skill. Athletes under taken an event with duration in exercise of 30-60 minutes of high intense exercise (particularly should consider their fluid loss). So, every athlete should have to drink by estimating by weigh themselves each time before and after training, and then calculate their weight changes in percent during training which indicates that athletes may drink water in liter per body weight lost by losses of sweat, to maintain their body fluid. The athletes must drink plenty of water before, during and after training based upon intensity and duration of their training.
- To be effective in training coaches and athletes must follow modern and scientific strategies in optimal nutritional practice around training, which helps to improve athlete's performance.

- The Hagerasalam project athletes and coaches must change their meal menu by adding foods like carbohydrates, fruits, vegetables and plant proteins. In contrarily they must decrease animal protein amount from meal menu. They must appreciate the major nutrients that provide calories to athletes are carbohydrate, fat and protein with in addition to other micronutrients.
- The athletes should identify and eat carbohydrate foods based on their glycemic index to maintain the blood glucose level by giving attention on type, intensity and duration of training load. It is most advisable to athletics for successful training.
- Athletes should try to spread their meals plan more than five meals and snacks per day and vegetarian athletes must be very careful in the selection of variety of the plant protein to compensate to animal protein.

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**Appendix A**  
**ADDIS ABABA UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**Faculty of Natural Science**  
**Department of Sport Science**

**Questionnaire to be Filled by Hagerselam Junior Athletes' Coach/es in SNNPR.**

The purpose of this questionnaire is to collect the adequate and essential data for the study on the effect of dietary and fluid intake before, during and after training on athletic performance. So, your experience, feelings, and suggestions are worthwhile for the study. Please be frank and respond to each item as accurately as possible.

**Instructions**

- No need of writing your name
- Where alternatives are given encircle the letter that you think the answer is
- Give precise and clear answer for the open ended questions.

**Thank you in advance for your cooperation!!**

**Part One. Background Information**

- Age \_\_\_\_\_
- Sex \_\_\_\_\_
- Education qualification \_\_\_\_\_
- Courses related to coaching athletics  
A. 1<sup>st</sup> level      B. 2<sup>nd</sup> level      C. Above no course taken
- Work experience \_\_\_\_\_ year/s
- Your coaching career in the site is  
A. Full timer  
B. Part timer  
C. If any other \_\_\_\_\_

## Part Two

1) What kinds and proportions of food do you appreciate to your athletes' to achieve their nutritional goal to fulfill energy and nutrient requirement before, during and after competition and training day?

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2) How do you assess and manage your athletes' diet and fluid intake to advise and recommend the appropriate diet and fluid at any required time?

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3) Do you provide to your athletes the update and in-depth information in nutrition practice and exercise physiology that athletes' need to make decision?

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4. Do you think an adequate dietary intake in terms of quantity and quality before, during and after training or competition significantly influences athletic performance?

A. Yes                      B. No                      C. uncertain

5. Do you appreciate and follow scientific and suitable nutritional practice strategies of dietary intake to ensure proper amount, kinds of food and fluid with appropriate time before, during and after training or competition?

A. Yes                      B. No                      C. uncertain

6. Do you promote recovery between training sessions with nutrition practice that will rapidly replace fluid and fuel lost, and allows the body to recover and adapt to training load?

A. Yes                      B. No                      C. uncertain

7. What type or method of training you follow most frequently in training?

A. Circuit                      B. Continuous                      C. Interval                      D. Fartlek

E. Almost all                      F. If any others \_\_\_\_\_

8. To what total duration of time in average your athletes perform training per day?

A. 1-2 hours B. 2-3 hours C. 3-4 hours D. If any other \_\_\_\_\_

9. When you provide training most often to your athletes.

A. Always, in morning C. Both morning and afternoon

B. Always, in afternoon D. No specific time

E. If any other \_\_\_\_\_

10. Is there any factors that hinder nutritional practice of your project athletes?

Please mention it in detail below.

\_\_\_\_\_

\_\_\_\_\_

11. What should be done to overcome unsound nutritional practices and to provide awareness on appropriate selection of food and fluids, timing of intake, and supplement choices for optimal health and exercise performance? Please provide your suggestion in detail below:

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

12. In what proportion of nutritional variety you appreciate your athletes to provide appropriated energy requirements based on intensity and duration of training. Please discuss it from highest to least variety of food? \_\_\_\_\_

13) Is there any factors that affect the optimal nutrition practice of your project athletes' around training and off day?

14) What do suggest in minimizing unsound nutritional practice of this center project athletes?

**Appendix B**  
**ADDIS ABABA UNIVERSITY**  
**SCHOOL OF GRADUATE STUDIES**  
**Faculty of Natural Science**  
**Department of Sport Science**

**Questionnaires to be Filled by Hagerselam Project Junior Athletes in  
SNNPR.**

The purpose of this questionnaires is to collect the basic data for the study on nutritional practical strategies around training and its effect on athletic performance specially in SNNPR Hagerselam junior project athletes. So, as to forward some information to facilitate and improve nutritional strategies before, during and after training based on scientific and modern approach to enhance athletic performance.

Your cooperation in providing relevant and candid information is highly important for the success of this study. Please, be frank and respond to each item as accurately as possible.

**Instructions**

- No need of writing your name
- Where alternative answers are given encircle the letter that you think the answer is
- Give clear and precise answer for the open ended questions.

**Thank you in advance for your cooperation!**

**Part one: Background Information**

- Sex \_\_\_\_\_
- Age \_\_\_\_\_
- Weight \_\_\_\_\_
- Do you face/have any health problem? \_\_\_\_\_  
If you say yes mention your health problems. \_\_\_\_\_
- Type of athletic event that you participate. \_\_\_\_\_
- When did you join this training center? \_\_\_\_\_

## Part Two: Forwarded Questions

1. How often do you eat a balanced diet?  
A. always            B. sometimes            C. rarely
2. What kind foods do you eat most frequently in your daily meals and snacks?  
A. Carbohydrate            B. Protein            C. Fats            D. Any other
3. What is your most favorite food, that you like to eat with interest?  
A. Carbohydrate            B. Protein            C. Fats            D. Any other
4. Do you think an adequate dietary intake in terms of quantity and quality before, during and after training or competition significantly influences athletic performance?  
A. Yes            B. No            C. uncertain
5. Do you appreciate and follow scientific and suitable nutritional practice strategies of dietary intake to ensure proper amount, kinds of food and fluid with appropriate time before, during and after training or competition?  
A. Yes            B. No            C. uncertain
6. Do you promote recovery between training sessions with nutrition practice that will rapidly replace fluid and fuel lost, and allows the body to recover and adapt to training load?  
A. Yes            B. No            C. uncertain
7. What kind of foods do you select eat most often immediately after heavy exercise sessions of training?  
A. High index carbohydrate            B. Low carbohydrate            C. Protein  
D. Fat
8. When do you eat breakfast, on the day of early training morning?  
A. before training            B. after training            C. not at all
9. How do you evaluate the access or opportunity to select, mix and match food this at your meals and snack at possible eating time?  
A. High            B. Moderate            C. Low

10. How much do you have awareness or knowledge about food choice, amount and composition of different foods in your meals and snacks based on your age, body size and intensity and duration of training?

---

---

11. How often do you eat a variety of plant protein in every day meals?

- A. always            B. sometimes            C. rarely

12. How often do you drink water during training that lasts more than 90 minutes?

- A. always            B. sometimes            C. rarely

13. What kind and amount of food do you need when the following time is remain for training?

**Time remain to training**

**kind and amount of foods**

A. Less than 1 hour

\_\_\_\_\_

B. 1-2 hour's

\_\_\_\_\_

C. Up to 3-4 hours and above

\_\_\_\_\_

14. How do you evaluate your current meal plan in terms of success in including a balanced athlete data with schedules in menu and moderation and the schedules of training program and time of meals?

---

---

15. IS your food mostly fresh? And how do you prepare you food mostly

---

---

**Appendix C**

**አዲስ አበባ ዩኒቨርሲቲ**

**ድህረ-ምረቃ ት/ክፍል**

**ስፖርት ሳይንስ ት/ክፍል**

**ለአትሌቶች የተዘጋጀ መጠይቅ**

የዚህ መጠይቅ ዋና አላማ የሀገረ ሠላም የፕሮጀክት አትሌቶች የአመጋገብ ታህ-ጃግለትም ከልምምድ በፊት፣ በልምምድ ሰዓትና ከልምምድ በኋላ የሚበሉትን የአመጋገብ ዘዴና የምግብ አይነትና ይዘት የሚያስከትለውን ተጽእኖ ለማጥናትና መፍትሔ ለመፈለግ መረጃ ለመሰብሰብ ሲሆን ይህንን ጥያቄ ለመሙላት የምትሰጡት መረጃ ለጥናቱ እጅግ ከፍተኛ ጠቀሜታ ያለው በመሆኑ እያንዳንዱን ጥያቄ በጥንቃቄ ሞልታችሁ ትመልሱልኝ ዘንድ በታላቅ ትህትና እጠይቃለሁ።

**ማሳሰቢያ:-**

- ቅጽ ሲሞላ ስም መጻፍ አያስፈልግም
- ቅጽ ሲሞላ አማራጭ መልስ ላለው መልሱን የያዘውን ፊደል በማክበብ ክፍታ በ የሚሞላውም ግልጽና በቂ የሆነ መልስ በመስጠት ተባበሩ።

**ለትብብራችሁ በጣም አመሠግናለሁ!**

**ክፍል አንድ**

- ያታ                    ሀ. ወንድ                    ለ. ሴት
- እድሜ \_\_\_\_\_
- ክብደት \_\_\_\_\_
- የጤንነት ሁኔታ \_\_\_\_\_
- የምትሳተፍበት/ፊው የአትሌቲክስ ዓይነት/ቶች \_\_\_\_\_
- ከመቼ ጀምሮ ነው \_\_\_\_\_
- ይህንን ስልጠና ማዕከል በመጀመሪያ ጊዜ የቀቀላቀልኩ/ሽው \_\_\_\_\_

**ክፍል ሁለት**

**የአትሌቶች መጠይቅ**

1. የተመጣጠነ ምግብ በሳምንት ምን ያህል ጊዜ ትመገባለህ/ሽ/?

ሀ. ሁሉጊዜ                      ለ. አልፎ አልፎ                      ሐ. አንዳንዴ

2. አዘውትራችሁ አብዛኛውን ጊዜ የምትመገቡበት/ቢው የምግብ አይነት \_\_\_\_\_?

ሀ. ሃይል ሰጪ                      ለ. ገንቢ                      ሐ. ለህይወት ጥቅም                      3. በጣም

3. የምትወጃው/ደው/ የምግብ አይነት የትኛው ነው?

ሀ. ሃይል ሰጪ                      ለ. የቅባት እህል                      ሐ. ገንቢ                      መ. “Fibers”                      ሠ. ሌላ ካለ

4. የተመጣጠነ ምግብ ብብዛትና በጥራት ከልምምድ በፊት፣ በልምምድ ላይ እና ከልምምድ በኋላ በአትሌቱ ችሎታ ላይ ተፅዕኖ ያመጣል ብለህ/ሽ ታስባለህ/ሽ/?

ሀ. አዎ                      ለ. አላስብም                      ሐ. እርግጠኛ አይደለሁም

5. የምትከተለው/ኒው/ የምግብ አወሳሰድ ሳይንሳዊና ዘመናዊ በሆነ መልኩ ነው?

ሀ. አዎ                      ለ. አይደለም                      ሐ. አላውቅም

6. በልምምድ መሀል እና ከልምምድ በኋላ ቶሎ ከድካም ለማገገም የምታደርጉት የምግብ አወሳሰድ ተሞክሮ አለህ/ሽ/ወይ

ሀ. አዎ                      ለ. አይደለም                      ሐ. አላውቅም

7. ከባድ እንቅስቃሴ ካደረግህ/ሽ በኋላ ወዲያውኑ ምን አይነት ምግብ መብላት ትመርጣለህ/ሽ/

ሀ. ከፍተኛ ሀይልና ሙቀት ሰጪ                      ለ. ዝቅተኛ ሀይልና ሙቀት ሰጪ  
ሐ. ገንቢ                      መ. ቅባትነት ያለው                      ሠ. የተገኘውን

8. ሁልጊዜ ጧት ጧት ከልምምድ በፊት ቁርስ ትብላለህ/ሽ?

ሀ. እበላለሁ                      ለ. አልበላም                      ሐ. አይታወቅም

9. ምግብ አማርጠህ /ሽ/ ለማግኘትና ለመብላት ያለህ/ሽ/ አጋጣሚ ምን ያህል ነው?

ሀ. ከፍተኛ                      ለ. መካከለኛ                      ሐ. ዝቅተኛ

10. ምግብን አማርጠህ/ሽ/ ለመብላት ያለህ/ሽ/ እውቀትና ግንዛቤ ምን ያህል ነው?

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11. ከዕድሜዎ የሚገኙትን ገንቢነት ያላቸውን ምግቦች ምን ያህል ጊዜ በሳምንት ትመገባለህ/ሽ/?

ሀ. ሁሉጊዜ                      ለ. አልፎ አልፎ                      ሐ. አንዳንዴ ለጥያቄ ተራ ቁጥር 11 መልስህ/ሽ

12. ውሃን በረጅም ልምምድ ጊዜ በሳምንት ምን ያህል ጊዜ ትጠጣለህ/ሽ/?

ሀ. ሁሉጊዜ                      ለ. አልፎ አልፎ                      ሐ. አንዳንዴ

13. የሚከተለው ሰዓት ለልምምድ ሰዓት ሲቀርብ/ሽ ምን አይነት መጠን ያለው ምግብ ትመገባለህ/ሽ?

ለልምምድ ቀሪ ሰዓት

የምግብ አይነት እና መጠን

ሀ. ከአንድ ሰዓት ያነሰ ጊዜ

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ለ. ከአንድ እስከ ሁለት ሰዓት

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ሐ. ከሦስት እስከ አራት እና ከዚያ በላይ

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14. አሁን እየተጠቀማችሁ ያለውን የምግብ እቅድ እንዴት ትገመግማለህ/ሽ/?

---

---

15. ምግብህን/ሽ/ እንዴት ታዘጋጃለህ/ሽ/? የምትመገበው/ቢው/ ምግብህ/ሽ/ ሁልጊዜ ትኩስ ነው?

---

---

## **Appendix D**

### **Interview Guide for Athletes**

1. When you drink water whether in training or out of training?
2. How much water do you drink per day?
3. Is there enough fibers in your diet?
4. Do you eat animal protein most frequently?
5. Is your food mostly fresh?
6. Do you eat most often dairy produce?

# **Appendix E**

## **Interview Guide for Coaches**

1. To what extents do you conduct training?
2. How do you evaluate your current meal menu in term of success in including a balanced athlete diet with variety in menu and moderation

# **Appendix F**

## **Interview Guide for Technical Director**

1. Is there any health problems that athletes faced in this center?

## Appendix G

**ቃለ መጠይቅ**

**ለምግብ አዘጋጆች**

1. ምግብ ስታዘጋጁ ንዕህና ትጠብቃላችሁ?
2. የምግብ አሰራራችና የምታስቀምጡበት ቦታ ምን አይነት ነው?

## Appendix H

### Observation Check List

	Yes	No	Uncertain
Are there a lot of different foods in their diet?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do they eat enough carbohydrates?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do they eat mostly complex carbohydrates?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do they eat animal proteins?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, are they mostly red meat?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Mostly fish and white meat?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do they eat eggs?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do they eat dairy produce?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do they eat a variety of plant proteins?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Are there a lot of vegetable fats in their diet?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is their food mostly fresh?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is their food mostly canned?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do they drink a liter, or more of water a day?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Do they drink mostly soft drinks?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is there enough fiber in your diet?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
How do you prepare your food mostly?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Steamed	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Grilled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Baked	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stir Fried	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boiled	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Fried	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

### Recommendations

<b>Foods to Add</b>	
<b>Foods to Decrease</b>	
<b>Changes in Storage</b>	
<b>Changes in Cooking</b>	

## **Appendix I**

### **Observation Guide**

1. Do they promote recovery with nutritional practice?
2. Do they eat all essential nutrients in their meals and snacks?
3. What kind foods they eat most frequently?
4. What looks like Hagerslam junior athletes experience of nutritional practice?
5. Do they have breakfast before training?
6. Do you they have access to get a variety of food around center?







**Appendix M**  
**Observation Check List**  
**Daily Water Recording form**

**Daily Assessment/Evaluation of Fluid or Water Intake for**

When they drink water	How much	Time interval	Total
Night before practice			
Four hours before event			
1-2 hours before practice			
During practice of less than one hour			
After training/practice			
Total			

**Appendix N**  
**Observation Check List**  
**Weight Monitoring Table to Balance Fluid Losses During**  
**Training form**

No	Code No of the athlete	Pre-exercise weight (Kg)	Post-exercise weight	Amount of fluid consumed during the session	Weight change	Water losses estimation
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

## **DECLARATION**

I declare that this thesis is my original work, has not been presented for a degree in another university and that all Sources of materials used for the thesis have been duly acknowledged.

**Name: - : -** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Date: -** \_\_\_\_\_

This has been submitted for examination with my approval, as a university advisor.

**Name: -** \_\_\_\_\_

**Signature: -** \_\_\_\_\_

**Date: -** \_\_\_\_\_