



## HERBAL SUPPLEMENTATION EFFECT IN COMBAT ATHLETES

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Due to the importance of a balanced diet and appropriate nutrition for athletic performance, herbal dietary supplements have become popular among professional and amateur athletes. Athletes frequently consume them to raise their performance during competitions. In the current study, combat athletes used Ashwagandha and Khejri as supplements to assess the changes in macronutrient levels and energy levels before and after supplementation. Supplementation with each herb and in combination was given in different groups in 500 mg doses daily with an intervention period of 21 days. Macronutrient and energy levels were evaluated before and after the intervention period. Subjects were divided into four groups: i) Group 1: Both supplement training group, ii) Group 2: Single supplement training group iii) Group 3: Both supplement non-training group, iv) Group 4: Single supplement non-training group. All groups showed significant enhancements in macronutrient and energy levels after 21 days of supplementation, ultimately enhancing their athletic performance. Supplementation with Ashwagandha and Khejri resulted in enhanced energy levels and macronutrients level such as carbohydrates, protein, and fat after 21 days of the intervention period in combat athletes.

**Keywords:** Ashwagandha, Herbal supplements, Macronutrients, Performance, *Prosopis cineraria* (Khejri).

### Introduction

For thousands of years, human civilizations and cultures have participated in aggressive actions related to war. Modern versions of these regulated activities, referred to as "combat sports," are the most popular events at the Olympic Games today. Boxing (39 medals), judo (43 medals), taekwondo (24 medals), freestyle wrestling (36 medals), Greco-Roman wrestling (18 medals), and Karate (Kumite = 18 medals) account for roughly 16% of the total medals awarded. A combat sport is a contact sport in which two competitors engage in a physical confrontation under specific contact regulations in an effort to simulate certain aspects of true hand-to-hand conflict. Participants in professional and amateur

combat sports have the option to employ their fists, elbows, knees, heads, or feet to strike an opponent (also known as striking sports), wrestle, throw, or pin an opponent to the ground (also known as wrestling sports), or grapple with an opponent in an effort to manipulate their body for the purpose of executing joint locks and chokes (also known as grappling sports)<sup>1,2</sup>. In sanctioned and structured combat sports, competitions are won by scoring a knockout, submission, technical knockout (the referee ending the match), or officials assigning points for better skills in technique and combat control<sup>3</sup>.

In order to lessen differences in competitors' size, strength, range, and/or leverage, combat sports divide athletes into

weight divisions. Official weigh-ins are held 3–24 hours prior to competitions in order to verify that athletes are within the acceptable weight range. Combatants frequently strive to participate in weight classes that are lighter than their normal weight, which is accomplished through chronic and short-term body mass alterations<sup>4</sup>. Despite the fact that these alterations may negatively impact one's health and overall performance, they can be used tactically to increase one's competitive success<sup>5,6</sup>. The degree of acute body mass loss that can be imposed and recovered will be identified by the amount of recovery time available after weigh-in or before competition. Important factors to take into account are the acute manipulations surrounding the weigh-in, which vary in significance, amount, and tactics according to the demands of the specific Olympic combat sport and its weigh-in rules. Exercise is increased, while calorie and fluid intake are controlled in an effort to reduce body water and body mass. Extreme weight-making activities can be dangerous when used improperly; hence, efforts have been made to lessen their prevalence<sup>7</sup>. The development of weight-making plans for athletes should take into account both the practices that each athlete can handle as well as the unique requirements and characteristics of their activity. The plan should outline the frequency and nature of acute weight loss workouts as well as the steps to take after the weigh-in to improve competition preparedness and reverse physiological abnormalities. Numerous strategies, such as employing supplements or following an adequate nutrition plan, have been shown to reverse performance gains<sup>8,9</sup>. Nutrition, a factor that is directly related to physical activity, may have an impact on post-workout regeneration, body composition, and athletic performance<sup>10</sup>. Supplements have many nutritional benefits and are able to fulfill all dietary needs, but

they come with some side effects and also contain some drug components, so they can have an overall negative impact on an athlete's body<sup>11</sup>. Recently, herbal supplements and seeds have become popular as nutraceuticals with performance enhancement potential and traditional Indian medicinal plants have gained attention with respect to their application in sports performance and sports injury<sup>12,13</sup>. Nowadays, herbal supplement ingestion has increased due to their beneficial effects without side effects<sup>13-16</sup>. The Dietary Supplement Health and Education Act (DSHEA) of 1994 defined the usage of herbal products as a "dietary supplement" and subject to regulation by the Food and Drug Administration (FDA) as a distinct category of foods<sup>17</sup>. *Prosopis cineraria* (khejri) and ashwagandha (*Withania somnifera*), two well-known herbal dietary supplements, have gained recent attention due to their high nutrient content of vitamins, minerals, proteins, essential and non-essential amino acids, phytochemicals, essential fatty acids, fibers, and carbohydrates, among other supplements<sup>18</sup>. Both of these supplements are novel in terms of usage by combat athletes for enhancing performance or for weight management<sup>11</sup>.

Ashwagandha (*Withania somnifera*), is a wild woody shrub that grows in India, Africa, and the Mediterranean<sup>19,20</sup>. Ashwagandha has been used for over 4,000 years. Winter cherry, Indian ginseng, and Ayurvedic ginseng are some of the common names for Ashwagandha<sup>21</sup>. The name derives from the phrase "smells like a horse." Ashwa means horse, while gandha means smell. The root is said to give a horse strength. Ashwagandha is a well-known adaptogen, renowned for its capacity to boost vitality, energy, endurance, and stamina, implying that it could improve athletic performance. Enhancing VO<sub>2</sub> max,

or the maximum amount of oxygen the body is capable of using when doing physical activity, enhances muscle efficiency and performance<sup>22</sup>. Over millennia, millions have taken the Ayurvedic herb ashwagandha as a traditional cure for general tiredness and to promote vigor and stamina. For millennia, it has been utilized for a variety of health advantages through effects on the neurological system, endocrine system, cardiovascular system, and energy generation system. Traditional Ayurvedic medicine also recommends ashwagandha for "bala" or "strength"<sup>23</sup>. Various studies have been conducted to determine the effects of ashwagandha supplementation on numerous sports-related physiological and biochemical parameters<sup>24,25</sup>, but we found research gap in studies on the macronutrient levels of training and non-training combat athletes.

The botanical name of Khejri, a state tree of Rajasthan that is revered by numerous people, is *Prosopis cineraria*. It has various climate adaptations, allowing it to flourish in a wide range of ecological conditions. It is also known as "Kalpatru," which means "King of the Desert," due to its food, feed, and medicinal properties<sup>26</sup>. The bark of khejri is dry, bitter with a harsh flavor, tonic, and aids in the prevention of leprosy, dysentery, asthma, leucoderma, piles, muscle spasms, and mental wanderings, among other things<sup>27</sup>. The blossoms are mixed with sugar and used to prevent miscarriage during pregnancy. Every component of khejri has a good impact on the human body<sup>28,29</sup>. Its bark ashes were placed over the skin to eradicate body hair. The smoke produced by its leaves is used to treat eye problems<sup>30</sup>. Khejri has many good effects on the human body, but limited studies have been done related to supplementation and sports performance<sup>31</sup>. Many studies have advocated the medical impact of khejri, but rarely any studies have been conducted to analyze the role of khejri

in sports performance enhancement<sup>32</sup>. The study of effect of Ashwagandha and khejri supplementation in combat athletes is novel and has not been done till date. The aim of the present study is to investigate the efficacy of *Prosopis cineraria* and ashwagandha supplementation on macronutrient and energy levels of combat athletes. Finally, the objective of the study was to examine the effect of twenty-one days of *Prosopis cineraria* and ashwagandha supplementation on macronutrient and energy levels of training & non-training group of combat athletes of Central University of Rajasthan.

### Material and Methods

#### Subjects:

This study included forty university combat athletes (aged 23.53±0.55 years). Subjects were considered proper combat athletes if they had at least three times a week of regular practice for at least four years prior to the study. Subjects were mandated to have not used any drugs or prescribed medications for at least one year before participation in the study, no known medical health issues or diseases, to no smoke or drink alcohol, and to have no history of cardio-respiratory disease. This study only included active combat athletes. Potential subjects who did not match the inclusion criteria were eliminated from the study. A written consent form was given to them to fill out with their general information, and they signed it with the condition that their data would be utilized for study and their agreement for volunteer participation. The document explained the risks, the benefits of their involvement, and the objective of the study. After obtaining consent, any potential questions were addressed to ensure clarity.

#### Study Design :

Figure 1 represents the experimental design of the study. Before pre-assessment, all testing procedure were fully explained to the all subjects. Firstly, Subjects were divided into two groups, one was the training group

n=20 (training 5 times a week, 40-50 min per day) and the other one was the non-training group n=20 (continuing their daily routine). After that division, training group were further divided into 2 other groups: Group 1 (n=10): Both supplements, Khejri (A) and Ashwagandha (B), Group 2 (n=10): Supplement Khejri (A). Non-training group were also divided into 2 other groups: Group 3 (n=10): Both supplements, Khejri (A) and Ashwagandha (B), Group 4 (n=10): Supplement Khejri (A). After separating the subjects, a pre-assessment was performed using a 24-hour dietary recall method to analyze their macronutrient and energy levels. Following that, subjects underwent a 21-day intervention period during which both supplements were administered to separate groups as well as in combination to determine the combined effect. The intervention lasted 21 days, and supplements were administered in 500 mg dosages daily. All subjects were required to complete a 21-day activity diary in which they had to fill in

what type of activity they conducted and how long they were physically engaged during the intervention period. Following the completion of the intervention period, post-assessments were conducted.

*Prosopis cineraria* and Ashwagandha supplementation :

Subjects in Group-1 and Group-3 (Supplement A+B) received one capsule of khejri (500 mg) after breakfast and one capsule of ashwagandha (500 mg) after lunch. Additionally, subjects in Group-2 and Group-4 (Supplement A) received one capsule of khejri (500 mg) after breakfast. The selected amount and time of ingestion were based on prior studies on supplements. Subjects were fed daily by giving water and supplements, but only group-1 and group-3 received the supplement ashwagandha in advance, which they had to take after lunch. The supplementation schedule was also followed up on phone calls and WhatsApp groups to ensure appropriate supervision of the research work.

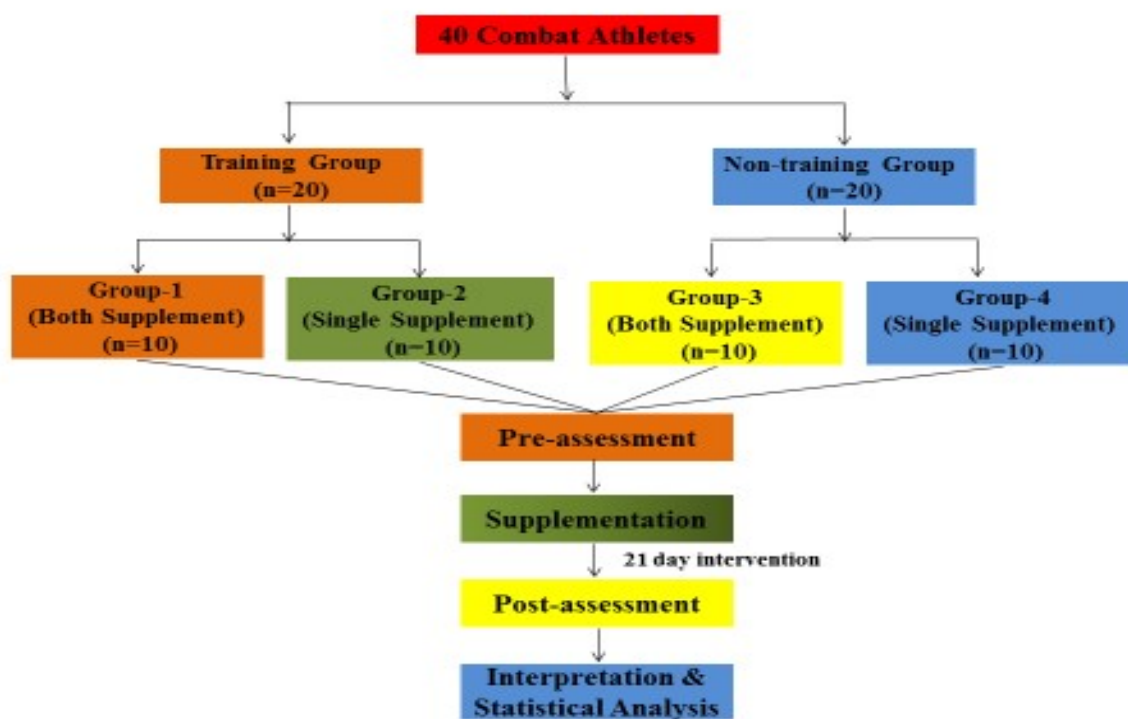


Figure 1. Schematic of the study design

**24 - Hour Dietary Recall :**

A 24-hour diet recall is a nutritional evaluation method that consists of a structured interview during which all athletes were asked to recall all food and drink taken in the past 24 hours for determining an athlete's energy and macronutrient levels. Athletes were advised to keep a food history for subsequent assessments and understanding of variations in energy intake.

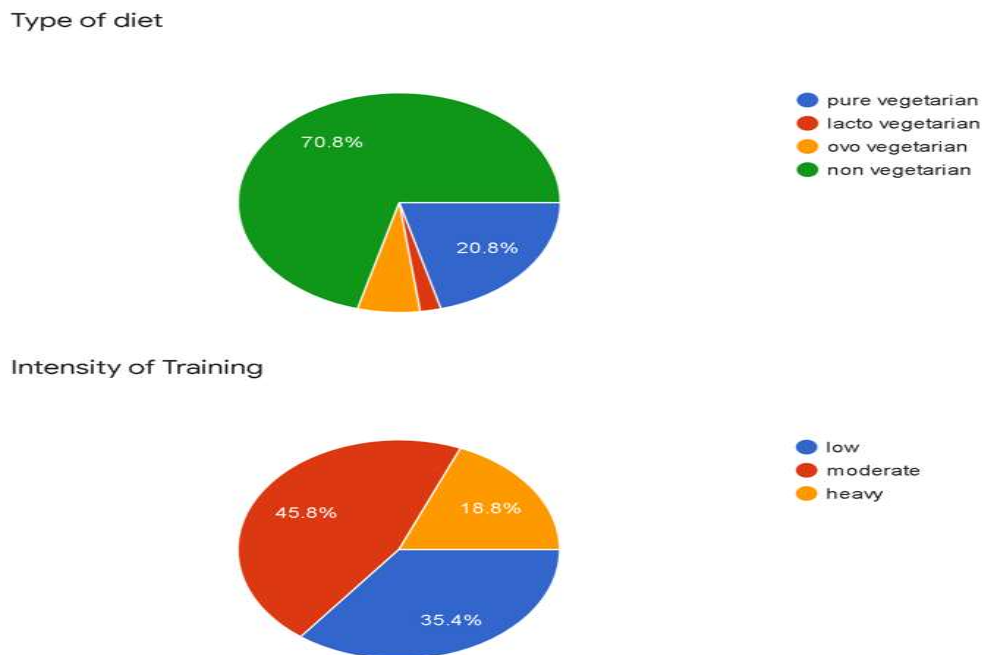
Statistical analyses were performed using SPSS software. Shapiro Wilk test was used to test the normality of data. Descriptive statistics were expressed as mean ( $\pm$ SD) for each variable. For the data collected in the current study, the mean value, standard deviation, standard error of mean, and independent 't' test was applied to analyze the data. The level of significance for all tests was at  $p < 0.05$ .

**Results and discussion**

In this research, we conducted an

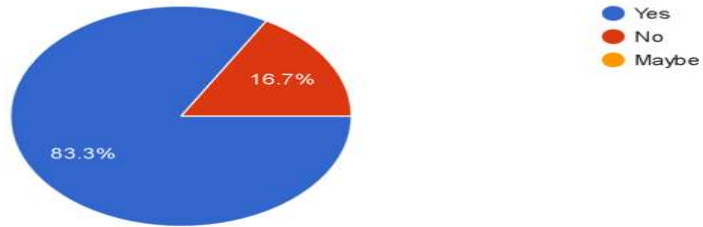
experimental study to see the effect of Khejri and ashwagandha supplements on combat athletes' macronutrient and energy levels. A total of 40 combat athletes took part in this experimental study, divided into four groups based on training and supplementation. Compared to pre-supplementation data of combat athletes, post-supplementation data showed significant enhancement in macronutrient and energy levels. The type of diet was different for athletes with 70.8% non-vegetarian and 20.8% pure vegetarian type of diet. Also, the intensity of training varied with 45.8% of athletes with moderate training, 35.4% with low-intensity training and 18.8% with heavy training (Figure 2).

The athletes were also asked about their perception of supplements and their effects before the intervention period. 83.3% of combat athletes were taking different supplements and 72.9% of them believed in positive effect of supplementation.

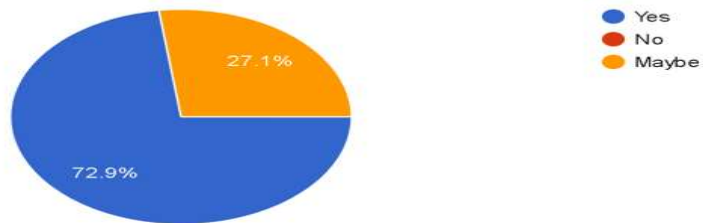


**Figure 2. Representation of combat athlete's type of diet and intensity of training.**

Do you take supplements?



Do you find any improvement / effect after supplementation?

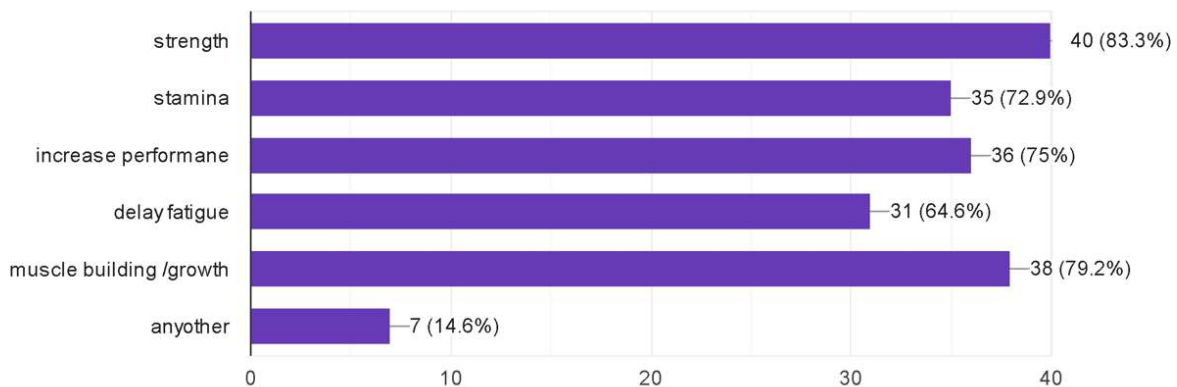


**Figure 3. Representation of supplement consumption and athletes’ perception of taking supplements before intervention.**

Athletes take supplements for various reasons, at which maximum, 83.3% of combat athletes responded that their aim of taking supplements is to increase strength. 79.2% responded to supplement intake for muscle building/growth, 75% responded

supplement intake for increasing performance, 72.9% responded to supplement intake for stamina, 64.6% responded supplement intake for delaying fatigue (Figure 4).

Aim of taking supplements



**Figure 4. Overview of the Aim of taking supplements by combat athletes**

Energy and macronutrient levels:  
 As shown in Table 1, energy levels were significantly enhanced after supplementation (before supplementation vs after supplementation: 1931±200.50 vs 2775±95.50, p<0.01) in combat athletes and reached the recommended values of energy. Carbohydrate (before supplementation vs after supplementation: 303.25±105 vs

450±15.920,p<0.01), protein (before supplementation vs after supplementation: 112± 20 vs 120±5.25, p<0.01) and fat (before supplementation vs after supplementation: 30±8.50 vs 55±10.75, p<0.01) intake also showed significant enhancement after supplementation and reached near the recommended amounts.

**Table1:Distribution of energy and macronutrient levels**

Components	Recommended Values	Before supplementation	After supplementation
Energy	3200 kcal	1931±200.50	2775±95.50
Carbohydrate	500-600 g	303.25±105	450±15.920
Protein	112-119 g	112± 20	120±5.25
Fat	62-108 g	30±8.50	55±10.75

This enhancement of macronutrient and energy levels will play a fundamental role in many body processes, such as protein, which gets all of the attention regarding physical activity. At the same time, carbs and lipids are equally crucial. They both provide energy and a variety of other benefits such as preventing disease, allowing the body to function correctly, etc. To optimize sports performance, athletes need to intake all macronutrients as recommended.

Carbohydrate availability as a fuel source for the skeletal muscles and neurological systems becomes a limiting element in the execution of extended sessions (490 minutes) of submaximal or intermittent high-intensity exercise but serves a permissive effect on the performance of quick high-intensity exercise. As a result of this, sports nutrition recommendations are focused on approaches to increasing carbohydrate availability in the body. These strategies incorporate carbohydrate consumption prior to and during

an athletic activity to supply fuel for that training session, along with carbohydrate consumption shortly after the session and throughout the day to boost refueling and recovery<sup>10</sup>. Athletes need to be discouraged from consuming fat in amounts less than 20% of their energy intake on a long-term basis because a decline in dietary variety related to these limitations is going to lower the intake of a wide range of nutrients, including vitamins that are fat-soluble and essential fatty acids, particularly n-3 fatty acids. If such a restriction of fat intake is adopted, it must be limited to acute situations that involve the prior-event diet, where concerns of preferable macronutrients or gastrointestinal comfort take precedence<sup>10,11</sup>.

**Conclusion**

Nutrition is critical for athletic performance and young athletes' proper growth and development. Sports and nutrition are inextricably linked and essential for athletes' improved performance. Combat athletes

must continually maintain their weight, which aids them throughout tournaments. In this study, an evaluation of energy and macronutrient levels was done to assess the nutritional status of combat athletes. It was found that energy and macronutrient levels were enhanced after ingestion of ashwagandha and khejri supplements. The increase in macronutrient levels and energy levels can be attributed to following reasons: 1) Combat athletes tend to compromise their diet and nutrition in order to manage their weight for competitions and after competition for recovery they increase the intake of food compared to the diet during competition 2) Since 50% combat athletes were on training, the requirement for higher food intake might have increased 3) The supplements Ashwagandha and Khejri have appetite enhancing effect. This explains the increase in macronutrients and energy levels after the 21 days intervention period of supplementation. Balanced energy and macronutrient levels are critical for combat athletes. Inadequate energy levels can lead to weariness, muscular mass loss, injury, and stunted growth. Obesity may also result from an excess of energy. Macronutrients, which include carbs, proteins, and fats, provide energy for physical activity, aid in repair and recovery, and aid in vitamin absorption. A balanced diet consists of 45% to 65% carbs, 10% to 30% proteins, and 25% to 35% fats. This study confirmed the salient role of both supplements in enhancing energy and macronutrient levels, which will play a huge role in enhancing combat athletes' performance.

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**Conflicts of interest:** None

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