

## Effects Of Ashwagandha (Withania Somnifera) Supplementation On Physical Performance And Health Parameters

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<b>Keywords</b> Ashwagandha, Adaptogen, Physical Performance, Strength, Endurance, Cardiovascular Efficiency, Ergogenic Aid.	<b>Abstract</b> In this study, the effects of Ashwagandha (Withania somnifera) supplementation on selected physical and physiological performance parameters among male physical education students was investigated. A randomized pre-test–post-test control group design was adopted. The experimental group was given 300 mg/day of Ashwagandha for 8 weeks, while the control group was given placebo. Variables assessed included body weight, BMI, grip strength, persistence time, 60-meter dash, basal pulse rate, recovery pulse rate, and physical efficiency index (PEI). Statistical analysis using paired t-tests revealed substantial improvements in muscular strength, endurance, speed, and cardiovascular recovery. However, the changes in Body mass index (BMI) were not statistically significant. The outcomes suggest that Ashwagandha supplementation enhances physical performance and can be used as a natural ergogenic aid.
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### 1. Introduction

The search for enhanced physical performance has been an integral part of human history, with natural remedies playing an important part in achieving it. Among these, herbal medicines have been extensively used by various cultures for improving strength, endurance, and overall well-being [1,2]. In India, a well-developed traditional system of medicine, Ayurveda, has long emphasized the use of herbs for therapeutic and performance-enhancing purposes [3]. These herbal interventions are increasingly gaining global attention, especially in the field of sports science and physical fitness [4,5]. Though their use is widespread, still majority of these herbs lack extensive scientific validation regarding their efficacy and mechanisms of action [6].

One such prominent herb is Ashwagandha (Withania somnifera), also known as “Indian ginseng” or “winter cherry.” It has a significant place in Ayurvedic medicine as a Rasayana, or rejuvenating tonic, believed to enhance vitality, longevity, and resistance to stress [3,7]. Traditionally, various parts of the plant have been used therapeutically, with the root being the most popularly utilized due to its potent medicinal properties [7]. Ashwagandha is well to possess adaptogenic qualities, which help the body cope with physical and psychological stress, thereby improving overall physiological functioning [8,9]. With regards to physical performance, Ashwagandha is known to cause improvements in muscular strength, endurance, and recovery [10,11]. It is believed to regulate cortisol levels, thereby reducing the adverse effects of stress on the body, such as muscle breakdown and immune suppression [9,12]. Additionally, it may enhance oxygen utilization, work capacity, and psychomotor performance, all of which are crucial for athletes and individuals engaged in regular physical activity [4,13]. The herb is also reported to possess anti-inflammatory, antioxidant, and immunomodulatory properties, contributing to better health outcomes and improved physical fitness [8,14].

From a physiological perspective, Ayurveda describes the concept of “Ojas,” a vital energy responsible for immunity, strength, and overall health [3]. Ashwagandha is believed to promote the formation and preservation of Ojas, thereby supporting bodily functions and enhancing resilience against stress-induced degeneration [7]. Modern scientific studies have attempted to validate these traditional claims by examining the herb’s effects on various biological systems, including the nervous, hematopoietic, and endocrine systems [8,15]. Preliminary research has indicated positive outcomes

such as increased hemoglobin levels, improved muscle strength, enhanced endurance, and better stress tolerance [10,11,16]. However, the available evidence remains limited and calls for more rigorous, controlled studies [6,17].

Recently, the interest in exploring natural and safe alternatives to synthetic performance-enhancing substances, particularly in sports and physical education [4,18]. Ashwagandha is a promising candidate in this regard due to its multifaceted benefits and relatively safe profile [8,19]. Nevertheless, scientific literature on its direct impact on physical performance, especially among specific populations such as physical education students, is still insufficient [17]. Therefore, the present study is aimed at investigating the effects of Ashwagandha supplementation on selected physical performance and health-related fitness parameters. By bridging the gap between traditional knowledge and modern scientific inquiry, this research seeks to provide a clearer understanding of the role of Ashwagandha in enhancing human physical performance and overall health. The use of herbal supplements as ergogenic aids has gained significant attention in sports science [5,18]. Ashwagandha (*Withania somnifera*), a traditional Ayurvedic herb, is known for its adaptogenic, anti-inflammatory, and performance-enhancing properties [8,19].

## **2. Materials and Methods**

### **2.1 Study Design and Participants**

The present study was designed to examine the effects of Ashwagandha (*Withania somnifera*) supplementation on selected physical performance and physiological parameters of male physical education students. The experimental design involved, employing a pre-test and post-test control group design. A total of 30 healthy male physical education students aged between 21–23 years were selected for the study. The participants were students of physical education institutions and were actively engaged in regular physical training. The study comprised of two groups: an experimental group and a control group. The experimental group received Ashwagandha supplementation, while the control group was given a placebo. The duration of the experiment was 8 weeks. The groups were asked to continue their regular physical training schedules during the study period to maintain uniformity in physical activity levels. The supplementation protocol consisted of administering two capsules per day containing 300 mg of Ashwagandha root powder to the experimental group (Dose A), while the control group (Dose B) received placebo capsules filled with glucose to maintain psychological balance and eliminate bias. The supplementation was continued daily for a period of eight weeks under controlled conditions. The supplementation was administered daily for a period of eight weeks under controlled conditions.

### **2.2 Variables and Parameters Measured**

The study assessed a range of physical and physiological parameters to assess the effects of supplementation. These included body weight (kg), body height (cm), and body mass index (BMI) as measures of physical characteristics. Muscular strength and endurance were evaluated through grip strength of both the right and left hands (kg) and persistence time for both hands (seconds). Cardiovascular responses were measured using basal pulse rate (beats per minute), pulse rate after exercise, and recovery pulse rates recorded at 1, 2, and 3 minutes post-exercise. In addition, cardiovascular endurance was measured using the Harvard Step Test. Performance-related variables included speed, measured through the 60-meter dash (seconds), and overall fitness level, evaluated using the Physical Efficiency Index.

### 2.3 Data Collection and Statistical Analysis

Standard instruments, including a weighing machine for measuring body weight, an anthropometric rod for height measurement, a grip dynamometer for assessing grip strength, and a Harvard Step Test bench for evaluating cardiovascular endurance were used for data collection. Pre-test measurements were made before starting supplementation. Post-test measurements were taken after the 8-week supplementation period using the same instruments and procedures. Statistical analysis was carried out to analyse the data. Mean, standard deviation (SD), and standard error of mean (SEM) were calculated. The ‘t’-test was used to compare the pre-test and post-test values and determine level of significance.

### 3. Results and Discussion

The present study examined the effects of Ashwagandha (*Withania somnifera*) supplementation on selected physical, physiological, and performance variables among male physical education students. The results obtained from pre-test and post-test measurements are presented below.

#### 3.1 Anthropometric Characteristics

Anthropometric characteristics are fundamental indicators of an individual’s physical structure and overall health status. Parameters such as body weight, height, and body mass index (BMI) provide essential information regarding body composition, growth, and nutritional status. In this study, anthropometric measurements were recorded to estimate the impact of Ashwagandha supplementation on the physical characteristics of male physical education students (Table 1).

**Table 1: Anthropometric Characteristics Before and After Supplementation**

Variable	Before (Mean ± SD)	After (Mean ± SD)	t-value
Age (years)	22.53 ± 1.89	22.53 ± 1.89	—
Height (m)	1.80 ± 0.49	1.80 ± 0.49	—
Weight (kg)	73.10 ± 4.09	75.33 ± 3.48	1.97*
BMI	21.53 ± 1.45	22.03 ± 1.08	0.53

\*Significant at  $p < 0.05$

A statistically significant increase in body weight was observed after supplementation, indicating enhanced muscle mass or improved metabolic efficiency. While there was a modest rise in BMI, the increase did not reach statistical significance, indicating that the observed weight gain was balanced and likely reflected a healthy, proportional change rather than an adverse trend.

#### 3.2 Muscular Strength and Endurance

Strength refers to the ability of muscles to exert force, whereas endurance represents the capacity of muscles to sustain repeated contractions over a period of time. In the present study, strength and endurance were assessed through grip strength and persistence time of both the right and left hands to investigate the effect of Ashwagandha supplementation on muscular performance (Table 2).

**Table 2: Strength and Endurance Parameters**

Variable	Before (Mean ± SD)	After (Mean ± SD)	t-value
Grip Strength (Right Hand, kg)	48.49 ± 4.69	52.93 ± 4.45	2.64*
Grip Strength (Left Hand, kg)	42.59 ± 3.57	47.88 ± 4.80	3.41*
Persistence Time (Right Hand, sec)	32.00 ± 2.79	34.77 ± 3.85	2.33*
Persistence Time (Left Hand, sec)	27.93 ± 1.84	30.80 ± 2.29	2.99*

\*Significant at  $p < 0.05$

It was observed that both grip strength and persistence time improved significantly. These improvements may be ascribed to the adaptogenic and anabolic properties of Ashwagandha, which support muscle recovery and growth.

### 3.3 Cardiovascular Parameters

Cardiovascular parameters are important indicators of the functional efficiency of the heart and circulatory system, particularly during rest and physical exertion. Variables such as basal pulse rate, exercise pulse rate, and recovery pulse rate reflect the body’s ability to transport oxygen, respond to physical stress, and recover after activity. In the present study, cardiovascular responses were measured to investigate the effect of Ashwagandha supplementation on cardiac efficiency and recovery capacity among male physical education students (Table 3).

**Table 3: Pulse Rate and Cardiovascular Responses**

Variable	Before (Mean ± SD)	After (Mean ± SD)	t-value
Basal Pulse Rate (beats/min)	71.13 ± 4.45	67.80 ± 6.80	6.71*
Pulse Rate After Exercise	169.03 ± 4.80	149.73 ± 8.08	7.83*

\*Significant at  $p < 0.05$

A significant reduction in basal pulse rate indicates improved cardiac efficiency. The decrease in pulse rate after exercise reflects enhanced cardiovascular adaptation and better oxygen utilization.

### 3.4 Recovery Pulse Rate

Recovery pulse rate is an important indicator of cardiovascular fitness and reflects the ability of the heart to return to its resting state after physical exertion. A faster recovery rate signifies better cardiovascular efficiency, improved oxygen utilization, and enhanced autonomic regulation. Assessing pulse rate at predetermined time points after exercise offers meaningful information about an individual’s ability to recover and serves as an important indicator of their overall cardiovascular endurance. In the present study, recovery pulse rate was recorded at different time intervals of 1, 2, and 3 minutes after exercise to assess the effect of Ashwagandha supplementation on post-exercise recovery among male physical education students (Table 4)

**Table 4: Recovery Pulse Rate (Post-Exercise)**

Variable	Before (Mean ± SD)	After (Mean ± SD)	t-value
Recovery after 1 min	126.02 ± 7.45	119.47 ± 6.58	2.90*
Recovery after 2 min	104.43 ± 5.60	85.90 ± 7.00	2.71*
Recovery after 3 min	78.40 ± 3.96	70.97 ± 5.40	3.66*

\*Significant at  $p < 0.05$

Significant improvements in recovery pulse rates indicate faster recovery following physical exertion. This suggests enhanced cardiovascular fitness and improved efficiency of the circulatory system.

### 3.5 Speed and Physical Efficiency

Speed and physical efficiency are essential components of athletic performance and overall fitness. Speed refers to the ability to perform movements in the shortest possible time, while physical efficiency reflects the body’s capacity to perform work with minimal energy expenditure and optimal physiological functioning. In the present study, speed was assessed using the 60-meter dash, and physical efficiency was evaluated through the Physical Efficiency Index to decide the effect of Ashwagandha supplementation on performance capabilities among male physical education students (Table 5).

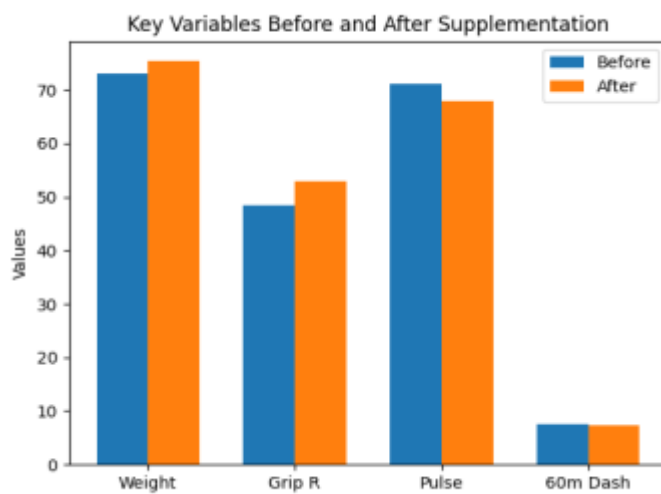
**Table 5: Performance Variables**

Variable	Before (Mean ± SD)	After (Mean ± SD)	t-value
60 m Dash (sec)	7.43 ± 0.69	7.28 ± 0.72	1.97
Physical Efficiency Index	29.14 ± 1.84	32.56 ± 1.95	1.67

Although improvements were observed in speed and physical efficiency, these were not statistically significant. This implies that Ashwagandha may have a moderate effect on speed, which might require longer duration or higher training intensity to yield significant results.

### 3.6 Performance Comparison

The study demonstrates that Ashwagandha supplementation significantly enhances muscular strength, endurance, and cardiovascular efficiency. The improvements in grip strength and persistence time suggest increased muscle performance, while reductions in pulse rate and improved recovery indicate better cardiovascular adaptation (Fig. 1).



**Fig. 1: A comparison of the key variables before and after supplementation**

The mechanism underlying these improvements may include: Enhanced oxygen-carrying capacity due to increased haemoglobin, Reduction in cortisol levels, leading to decreased muscle breakdown, Improved ATP-CP energy system efficiency, Adaptogenic effects that reduce physiological stress. The findings align closely with earlier research, which has consistently demonstrated notable enhancements in physical performance associated with Ashwagandha supplementation. Participants in the control group exhibited modest gains across all measured parameters, likely reflecting the natural effects of consistent physical training rather than any specific intervention. Nevertheless, these improvements did not reach statistical significance, suggesting that the enhancements observed in the experimental group were largely attributable to Ashwagandha supplementation rather than the effects of training alone.

### Conclusion

Based on the study, these conclusions were made: taking Ashwagandha led to a noticeable increase in body weight. This likely means an increase in lean muscle and better metabolism. Although BMI increased slightly, the change wasn't significant, suggesting the weight gain was healthy and balanced, not harmful. There were clear improvements in muscle strength and endurance. This was shown by stronger grip strength and the ability to hold effort longer with both hands. These results suggest that Ashwagandha helps improve muscle performance, possibly because of its natural muscle-building and stress-reducing properties. The study also found better heart efficiency. Resting heart rate decreased, and recovery after exercise improved, meaning the heart was working more efficiently and the body was recovering faster. This points to better oxygen use and overall fitness. Some improvements were seen in speed (60-meter run) and overall physical efficiency, but these changes were not significant.

This means Ashwagandha may help performance, but longer or more intense training might be needed to see bigger results.

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