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Effect Of Ashwagandha (Withania Somnifera) Root Powder Supplementation On Sprint Fatigue Level In Hockey Players

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ABSTRACT

Withania Somnifera (WS) is having significant effects on anti-inflammatory, nervine tonic, nerve soothing, antioxidant, immunomodulator, free radical scavenger, adaptogen, antiarthritic, antispasmodic, anti -stress and anti-cancer. But ergogenic value of WS as nutritional supplement is yet to be established. **Objectives:** Present study was designed to investigate the effect of supplementation of WS on the sprint fatigue level in Hockey Players. **Method:** Thirty two male hockey players, with a mean age of 17.3 ± 1.8 years and BMI 20.7 ± 2.8 kg/m2 volunteered for the study. Subjects were randomly assigned into two groups Group I (n= 24): Withania somnifera group (experimental group) and Group II (n=24): Placebo (control) group. The experimental group received 500 mg capsules of aqueous roots of Ashwagandha twice daily for eight weeks, whereas the placebo group received starch capsules. Sprint fatigue level was assessed with **Mackenzie B. (2006) 40 Metre Multiple Sprint Test.** Test in both experimental and control groups before and after the administration of Withania somnifera and placebo respectively. **Results:** A significant improvement in the sprint fatigue level after 4 weeks ($t = 1.83$, $p < 0.10$, on tail rest) and 8 weeks ($t = 2.45$, $p < 0.02$, one tail test) in experimental group was found. Whereas, no significant improvement in the control group for sprint fatigue level after 8 weeks of placebo supplementation was found. **Conclusion:** Supplementation of Withania Somnifera improves sprint fatigue level in young hockey players.

Key Words: Withania Somnifera, sprint fatigue and Placebo.

INTRODUCTION:

The plant Withania Somnifera commonly known as “Ashwagandha” is well known for its therapeutic use in the ayurvedic system of traditional medicine. It has been used as an antibacterial, antioxidant, adaptogen, aphrodisiac, liver tonic, anti- inflammatory agent (Puri HS , 2003). It is a reputed health food and herbal tonic and used for cardiovascular diseases in ethnomedicine. It is available for human use either as a single herb or an ingredient of

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polyherbal or herbomineral formulations. Withania somnifera, also known as Indian ginseng, widely used in

the Ayurvedic medicine, belongs to the family of Solanaceae. Leaves, fruits, seeds, shoots and roots of this plant have all been used traditionally as well. The roots of Withania Somnifera contained 35 chemical constituents. Withaferin A and withanolides, the active ingredients contribute to the most of the biological actions of Withania. Furthermore, the roots of this plant are reputed to promote health and longevity by augmenting defense against some diseases, arresting the aging process, revitalizing the body in debilitated condition, increasing the capability of individual to resist adverse environment factors and by creating a sense of mental well being (Mishra LC; 2003).

Aphale et al. (1998) reported in a study conducted on rats, intake of ginseng and ashwagandha for 90 days, researchers found significant increase in body weight, food consumption and liver weight, and improved hematopoiesis. They did not reveal any toxicity of brain, heart, lung, liver, spleen, kidneys, stomach, testis and ovaries. Further the side effects of WS were not significantly different from those experienced by placebo-treated individuals Cooley et al. (2009) and Chopra et al.(2004). The human doses of Ashwagandha are generally in the range of 4-6 g/day and expected to be safe and non-toxic. Withania contains active ingredients like steroidal alkaloids and lactones known as “withanolides”. Withaferin A and withanolide D are the two main withanolides that contribute to most of the biological actions of Withania (Matsuda et al. 2001; Sharma V et al. 2011). Stress, as a major cardiovascular risk factor leads activation of sympathoadrenal and hypothalamic pituitary adrenal (HPA) axis and causes oxidative stress. Withania possesses a potent anti-stressor effect and is reported to alleviate stress induced changes and provides cardio protection in ischemic rats similar to the properties ascribed to adaptogens like Panax ginseng. It also increases heart weight and glycogen in myocardium and liver indicating intensification of the anabolic process and enhances the duration of contractility as well as coagulation time (Dhuley 2000). So, this study was planned to assess the effect of Ashwagandha on hypertensive subjects.

Long term strenuous exercises release of free radicals that causes oxidative damages of varied amount on different systems of human body. Stress can cause increased peroxidation of lipids, while decreasing levels of the antioxidant enzymes catalase and glutathione peroxidase. When Ashwagandha extract was administered by re-searchers one hour before a daily stress-inducing

procedure, all of the aforementioned parameters of free radical damage normalized in a dose-dependent manner Bhattacharya at el. (2001). Thus, ashwagandha probably is safe without serious side effects. There are only few scientific clinical studies showing effect of WS on selective parameter of exercise performance after regular administration when given as supplements. The present study was therefore designed and performed to assess the effects of

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Withania somnifera (Ashwagandha) on the Sprint Fatigue level which is the key for all form of sports/games.

METHODOLOGY:

The present randomized controlled, parallel group, single blinded study was conducted on thirty two male hockey players, with a mean age of 17.4 ± 1.7 (aged between 16 to 19 years) years and BMI 20.9 ± 2.9 kg/m^2 from Shri Guru Hari Singh Hockey Academy, Shri Jiwan Nagar, Sirsa, Haryana, who volunteered for the study. Subjects were randomly assigned into two groups using the chit in a box method, Group I (n=16): Withania somnifera group and Group II (n=16): Placebo (control) group. Withania somnifera was used in the form of a standardized aqueous root extract was obtained from Central Council for Research in Ayurveda and Siddha (CCRAS), Delhi, India. Prior to the start of data collection, participants were explained about the drugs and previous research supporting the effectiveness on physical performance and possible side effects due to overdose. Only then the subjects who volunteered to participate in the study were recruited. A written informed consent was taken from each participant and their parent prior to recruitment.

Quality and dose of drug was decided after consultation with the Ayurvedic Medical Officer of civil hospital, Sirsa. 500mg of roots of WS and 500mg of sugar power was filled in gelatin capsules and stored in air tight containers and in room temperature below 30°C throughout the experiment. Drug and sugar capsules were given to their respective groups (Experimental and Controlled) in the dose of 1 capsule/day orally with milk after meals at night for 8 weeks under the personal supervision of researcher. Subjects were unaware of which group they were in and which drug they were to receive. It was thus a single blinded study, where all the subjects were completely unaware of drugs which they were going to consume. Sprint Fatigue level was assessed with with **Mackenzie B. (2006)** ***40 Metre Multiple Sprint Test*** of both experimental and control groups were measured before and after the administration of Withania somnifera. The data was analyzed by student „t" test(one tail) with Statistical Package for Social Sciences (SPSS - 20) software.

RESULTS:

Results of the table- 1 indicates that the mean Pre Test and Mid Test (After 4 Weeks) Sprint Fatigue Level of placebo group (control group) before the supplementation of placebo (Pre Test) is 4.26 and after 4 weeks supplementation of placebo (Mid Test) it is 4.12. The mean difference is 0.14, which is in favor of mid test. The t value is 0.55, which is less than the table value of 1.68 at 0.10 levels (one tail test) of significance for 40 degrees of freedoms.

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Table – 1

Comparative status of Pre Test and Mid Test Sprint Fatigue Level in Placebo Group (Control Group)

S. No.	Phase	Mean	S.D	Mean Difference	S.E.D	t – Value	P Value
1.	Pre Test	4.26	0.84	0.14	0.255	0.55	Not Significant
2.	Mid Test	4.12	0.81				

Similarly mean Sprint Fatigue level of placebo group (control group) before the supplementation of placebo (Pre Test) is 4.26 and after 8 weeks supplementation of placebo (Post Test) it is 4.09 The t value is 0.64, which is less than the table value of 1.68 at 0.10 levels (one tail test) of significance for 40 degrees of freedoms.

Table – 2

Comparative status of Pre Test and Post Test Sprint Fatigue Level in Placebo Group (Control Group)

S. No.	Phase	Mean	S.D	Mean Difference	S.E.D	t – Value	P Value
1.	Pre Test	4.26	0.84	0.17	0.264	0.64	Not Significant
2.	Post Test	4.09	0.87				

Whereas table - 3 indicates that mean Sprint Fatigue Level of Experimental Group before the supplementation of Ashwagandha (Pre Test) is 4.24 and after 4 weeks supplementation of Ashwagandha (Mid Test) it is 4.02. The mean difference is 0.22, which is in favor of pre test. The t value is 0.92, which is less than the table value of 1.68 at 0.10 levels (one tail test) of significance for 40 degrees of freedoms. It means that there is no significant improvement in the Withania Somnifera group (Experimental Group) for Sprint Fatigue level after 4 weeks of Ashwagandha (Withania Somnifera) supplementation.

Table – 3

Comparative status of Pre Test and Mid Test Sprint Fatigue level in Withania Somnifera Group (Experimental Group)

S.No.	Phase	Mean	S.D	Mean Difference	S.E.D	t – Value	P Value

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1.	Pre Test	4.24	0.83	0.22	0.239	0.92	NotSignificant
2.	Mid Test	4.02	0.71				

Similarly mean Sprint Fatigue level of Withania Somnifera group (Experimental Group) before the supplementation of Ashwagandha (Pre-Test) is 4.24 and after 8 weeks supplementation of Ashwagandha (Post Test) it is 3.52. The mean difference is 0.72, which is in favor of Pre Test. The t value is 2.91, which is more than the table value of 2.43 at 0.02 levels (one tail test) of significance for 40 degrees of freedoms. Hence, there is a significant improvement in the Withania Somnifera group (Experimental Group) for Sprint Fatigue level after 8 weeks of Ashwagandha (Withania Somnifera) supplementation.

Table – 4

Comparative status of Pre Test and Post Test Sprint Fatigue level in Withania Somnifera Group (Experimental Group)

S.No.	Phase	Mean	S.D	Mean Difference	S.E.D	t – Value	P Value
1.	Pre Test	4.24	0.83	0.72	0.247	2.91	Significant at 0.02 level
2.	Post Test	3.52	0.77				

DISCUSSION OF RESULTS:

According to table 1 and 2 the t value is 0.55 and 0,64, which are not significant. It means that there is no significant improvement in the Pre Test, Mid Test and Post Test in Sprint Fatigue level after 4 and 8 weeks of placebo supplementation. Whereas table 3 and 4 reveals as t value is 0.92 and 2.91, which are significant also, indicates that there is a significant improvement in the withania somnifera group (Experimental Group) for Sprint Fatigue level after four and eight weeks of Ashwagandha (Withania Somnifera) supplementation.

The growth-promoting effect of WS was studied for 60 days in a double-blind study of 60 healthy children, age 8-12 years, experienced a slight increase in hemoglobin, packed cell volume, mean corpuscular volume, serum iron, body weight, and hand grip, and significant increases in mean corpuscular hemoglobin and total proteins ($p<0.01$) at the end of 60 days when compared to the initial level and the placebo group Venkataraghavan at el.(1980). WS may induce the synthesis of inducible nitric oxide expression likely by acting at transcriptional level Iuvone at el.(2003). Shenoy S et al. (2012) found that eight weeks of Ashwagandha supplementation increased endurance, respiration capacity and metabolic efficiency among cycling athletes.

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Colorado State University researchers found that Ashwagandha and other Ayurvedic herbs help protect the heart from oxidative damage Reuland DJ et al.(2012). The effect of Ashwagandha on glycosaminoglycan synthesis in the granulatio n tissue of carrageenin- induced air pouch granuloma was studied. Ashwagandha is shown to exert significant inhibitory effect on incorporation of ribosome -35S into the granulation tissue. The uncoupling effect on oxidative phosphorylation (ADP/O ratio reduction) was also observed in the mitochondria of granulation tissue. Further, Mg2+ dependent ATPase activity was found to be influenced by Ashwagandha. Ashwagandha also reduced the succinate dehydrogenase enzyme activity in the mitochondria of granulation tissue (Begum & Sadique, 1987). Biswal BM et al.(2012) from Malaysia's University Sains found that Ashwagandha reduced fatigue and increased general well-being among patients who were undergoing chemotherapy. Raut AA et al.(2012) from the ICMR Advanced Centre for Reverse Pharmacology in Traditional Medicine found in a 30-day clinical trial among 18 healthy volunteers that 750-1250 milligrams of Ashwagandha per day reduced cholesterol, improved sleep and increased muscle strength. Research from Germany's University of Tuebingen discovered that Ashwagandha reduces oxidative stress and alters gene expression to help cells with energy production Sabir F et al. (2012).

Analytical reports on Ashwagandha suggest that this herb has a rich array of a diverse spectrum of bioactive compounds Chaurasiya ND et al. (2008). The abundance of phytochemicals with antioxidant properties, such as phenolic, flavonoids, and carotenoids may be held responsible for the rejuvenating activity of this medicinal herb. This explains the inclusion of this herb in the Indian system of Ayurvedic lists in promoting longevity and other pharmacological effects Widodo N et at. (2008). In spite of the many properties attributed to Ashwagandha, there is a shortage of clinical scientific evidence for its use in athletes. Present study provides a scientific basis for the use of Ashwagandha supplementation by athletes.

Though there are many factors that could contribute to the increase in the Sprint Fatigue level, we believe that an increase in the Sprint Fatigue is due the ability of Ashwagandha to provide healthy long-lasting energy for enhanced performance, improving recovery from workout-derived stress and fatigue, and increasing anabolic metabolism to promote lean muscle development. An added benefit of this stress reduction is that many people feel an enhanced mood when taking Ashwagandha. In addition, most athletes know that maintaining a healthy weight helps enhance performance. Further studies on Sprint Fatigue level would provide conclusive evidence regarding the mechanism of the ergogenic effect of Ashwagandha. Thus, the above findings clearly indicate that the traditional use of Ashwagandha has a logical and scientific basis. Large scale clinical studies are needed to prove the clinical efficacy of this herb, especially in sports performance.

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CONCLUSION:

Withania somnifera may therefore be useful for to improve the Sprint Fatigue level after 8 weeks of Ashwagandha (Withania Somnifera) supplementation. Drug appears to be safe for young adults when given for mentioned dosage and duration. The forthcoming researches should focus on dose finding, longer treatment duration as well as gender specific effects of WS Further studies are also required to measure whether the drugs can improve other parameters of physical fitness so that in future Withania somnifera can be used as ergogenic elements.

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