

# Scientific Studies on KSM-66<sup>®</sup> Ashwagandha



KSM-66<sup>®</sup>   
a s h w a g a n d h a

**Clinically Proven & Award Winning**  
**World's Best Ashwagandha**



## WHAT MAKES KSM-66 THE WORLD'S BEST ASHWAGANDHA?

**Highest Concentration:** Created via a process that took 14 years of R&D to develop and refine, KSM-66 is the highest concentration ashwagandha root extract available on the market today, produced using a first-of-its-kind extraction process, based on "Green-Chemistry" principles, without using alcohol or any other chemical solvents.

**Tight vertical integration for price advantage and high quality:** Ixoreal is the only ashwagandha manufacturer in the world to own the entire value chain in producing the extract. Ixoreal has its own farms, production facilities, testing laboratories, research center and distribution. As a result, Ixoreal is unmatched in its ability to deliver high-quality ashwagandha with steady supply and batch-to-batch consistency.

### Highest number of quality certifications:



**United States Pharmacopeia-GMP**  
(Dietary Ingredient Verification Program)

**The most extensive set of research studies and clinical trials:** Ixoreal is the industry leader in clinical trials and basic research investigating the effectiveness of ashwagandha.

- Largest pool of research studies: 11 human studies completed, 8 on-going human studies and 3 animal studies
- Gold Standard Studies: Double-blind, placebo controlled, randomized
- Our trials are all on healthy populations to mirror our mainstream customer base
- Our publications are of academia standard, all in PubMed-indexed, mainstream medicine journals
- The principal investigators are leading researchers with established publication records

### Winner of several awards and honors:

- "Product Innovation in Botanicals Award" by Frost and Sullivan 2014
- "Best Botanical Ingredient" at Engredea 2013
- "Ingredient of the Year" at Panacea 2012



## ❖ KSM-66 ASHWAGANDHA FOR STRESS AND ANXIETY

**OBJECTIVE:** To evaluate the safety and efficacy of KSM-66 Ashwagandha in reducing stress and anxiety and in improving the general well-being of adults under stress.

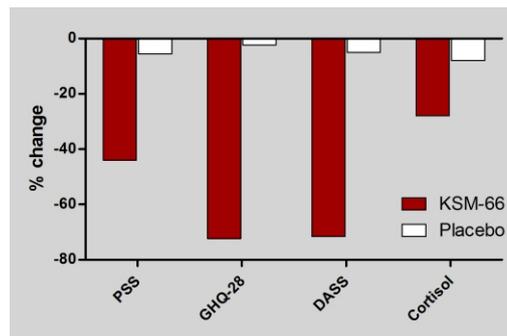
**DOSE:** 300 mg twice daily

**DURATION:** 8 Weeks

**NUMBER OF SUBJECTS :** 64 healthy volunteers

**EFFICACY MEASURES :** The efficacy measures were the Perceived Stress Scale (PSS) score, serum cortisol level, General Health Questionnaire-28 (GHQ-28) score and Depression Anxiety Stress Scale (DASS) score.

### RESULTS:



**PSS scores:** KSM-66 Ashwagandha caused noticeable decrease in Perceived Stress among the subjects. At the end of the study, KSM-66 Ashwagandha produced 44.0% reduction in PSS scores from the baseline, which is statistically significant ( $P < 0.001$ ) compared to placebo group.

**Serum cortisol levels:** A statistically significant decrease ( $P < 0.05$ ) of 27.9 % was observed in serum cortisol level as a result of KSM-66 Ashwagandha treatment.

**GHQ-28 scores:** KSM-66 Ashwagandha produced marked reduction in the GHQ-28 domain scores. It produced 72.3% decrease ( $P < 0.001$ ) in total GHQ-28 scores from the baseline at the end of 60 days study. The GHQ-28 domain scores for 'somatic', 'anxiety and insomnia', 'social dysfunction' and 'severe depression' reduced significantly by 76.1%, 69.7%, 68.1% and 79.3% respectively from the baseline ( $P < 0.001$ ).

**DASS domain scores:** KSM-66 Ashwagandha reduced depression, anxiety and stress in the study subjects, as evident in DASS scores. It produced 71.6% decrease ( $P < 0.001$ ) in total DASS scores. The DASS scores for depression, anxiety and stress domains reduced significantly ( $P < 0.001$ ) by 77.0%, 75.6% and 64.2% respectively with KSM-66 Ashwagandha supplementation.

### MODES OF ACTION:

- Stress is accompanied by increase in serum cortisol level. Ashwagandha being an adaptogen is known to promote homeostasis, regulate HPA-axis function and reduces serum cortisol level.
- Ashwagandha possesses GABAergic activity to ionotropic GABAA and GABA<sub>B</sub> receptors which results in reduction of over-excitation of neurons, thereby producing calmness, reducing stress and increasing focus, mental well-being and self-control.
- There is emerging evidence suggesting the role of ashwagandha in suppressing stress-induced increase of dopamine receptors in the corpus striatum of the brain. It is also claimed to reduce stress-induced increase of plasma corticosterone, blood urea nitrogen and blood lactic acid.



## ❖ KSM-66 ASHWAGANDHA FOR MALE SEXUAL FUNCTION

**OBJECTIVE:** To evaluate the efficacy of KSM-66 Ashwagandha in improving male sexual function in otherwise healthy males.

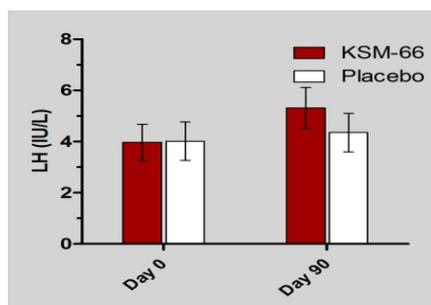
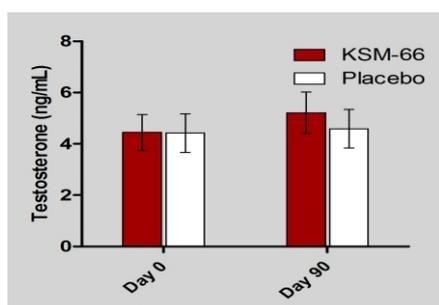
**DOSE:** 225 mg thrice daily

**DURATION:** 12 Weeks

**NUMBER OF SUBJECTS :** 46 male subjects

**EFFICACY MEASURES :** The efficacy measures were the sperm concentration, semen volume, sperm motility, serum testosterone levels and serum luteinizing hormone levels.

### RESULTS:



**Sperm concentration:** KSM-66 Ashwagandha improved the sperm concentration among the male study subjects. A significant ( $P < 0.001$ ) increase of 167% was observed in sperm concentration in the subjects supplemented with KSM-66 Ashwagandha at the end of the therapy.

**Semen volume:** A significant 53% ( $P < 0.001$ ) increase in semen volume was observed in ashwagandha treatment group when compared to placebo group.

**Sperm motility:** The study showed a significant increase of 57% in sperm motility in ashwagandha treatment group when compared to placebo group ( $P < 0.001$ ).

**Serum testosterone level:** Therapy with KSM-66 Ashwagandha produced a 17% increase in serum testosterone levels in study subjects when compared to placebo group ( $P < 0.001$ ).

**Serum luteinizing hormone:** Therapy with KSM-66 Ashwagandha produced a significant ( $P < 0.001$ ) improvement of 34% in serum luteinizing hormone levels when compared to placebo group.

### MODES OF ACTION:

- Stress is known to be a causative factor in male infertility. Ashwagandha's proven adaptogenic effects, antioxidant action and its ability to modulate the stress response therefore improves the male fertility. Ashwagandha results in significant decrease in cortisol levels, increase in testosterone, regulation of other reproductive hormones and improvement in overall semen quality.
- Ashwagandha may have a direct spermatogenic influence on the seminiferous tubules by exerting a testosterone like effect.
- Ashwagandha reduces serum cortisol level through regulating HPA-axis function. Increase in cortisol level has a negative effect on sperm production in male human body.



## ❖ KSM-66 ASHWAGANDHA FOR CARDIO-RESPIRATORY ENDURANCE

**OBJECTIVE:** To evaluate the effect of KSM-66 Ashwagandha in improving cardio-respiratory endurance in healthy athletic adults.

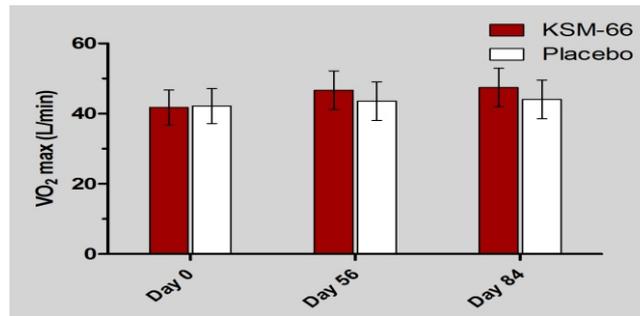
**DOSE:** 300 mg twice daily

**DURATION:** 12 Weeks

**NUMBER OF SUBJECTS :** 49 healthy athletic male adults

**EFFICACY MEASURES :** The efficacy measures were  $VO_{2\max}$  by shuttle run test, World Health Organization- quality of life (WHO-QOL) questionnaire scores.

### RESULTS:



**$VO_{2\max}$ :** The 12 week therapy of KSM-66 Ashwagandha showed marked improvement in maximum oxygen consumption ( $VO_{2\max}$ ) in healthy athletic adults. A significant increase ( $P < 0.001$ ) of 11.8% and 13.6% was observed in  $VO_{2\max}$  at Day 56 and Day 84 respectively in ashwagandha supplemented group when compared to placebo group.

**WHO-QOL scores:** The supplementation with KSM-66 Ashwagandha produced significant ( $P < 0.05$ ) improvement in Physical health, Psychological, Social relationship and Environmental domain scores through WHO-QOL questionnaire study when compared to placebo group in healthy athletic adults after the 12 week therapy. KSM-66 Ashwagandha produced 14.8%, 19.7%, 21.6% and 9.7% increase in WHO-QOL scores of Physical health, Psychological, Social relationship and Environmental domain respectively, from the baseline value.

### MODES OF ACTION:

- Ashwagandha increases energy production in muscles through its beneficial effects on mitochondrial energy levels and functioning and thereby reduce the activity of the  $Mg^{2+}$ -dependent ATPase enzyme responsible for the breakdown of ATP.
- Ashwagandha has been demonstrated to increase creatine levels, which leads to more efficient phosphocreatine production, which leads to ATP activity to generate rapid energy for muscle contraction and movement.
- Ashwagandha improves the hemoglobin count and red blood cell (RBC) count. The increase in RBC mass leads to an increase in the capacity of blood to transport oxygen at a greater capacity to the peripheral system, thus ensuring a greater  $VO_{2\max}$ .
- Ashwagandha increases the level of succinate dehydrogenase (SDH). SDH in turns provides increased cellular energy. The ashwagandha root helps to support the nervous system and adrenals, helping to maintain energy levels during times of stress and prevent the body from "burning-out".



## ❖ KSM-66 ASHWAGANDHA FOR MUSCLE STRENGTH AND RECOVERY

**OBJECTIVE:** To evaluate the effect of KSM-66 Ashwagandha on muscle strength, mass and recovery, as an adjuvant to resistance training program and an ergogenic aid.

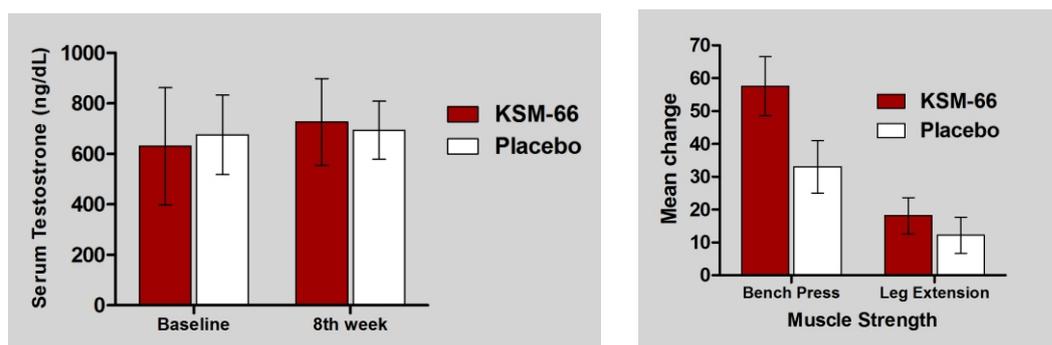
**DOSE:** 300 mg twice daily

**DURATION:** 8 Weeks

**NUMBER OF SUBJECTS :** 50 male healthy volunteers

**EFFICACY MEASURES :** The efficacy measures were serum testosterone levels, muscle strength (maximal sustainable single-repetition load -1RM), muscle size (in cm<sup>2</sup>), body fat percentage and serum creatine kinase level.

### RESULTS:



**Serum testosterone levels:** KSM-66 Ashwagandha produced marked increase in serum testosterone levels which can be associated with muscle growth and increased muscle strength. At the end of 8 weeks, a statistically significant ( $P < 0.05$ ) increase of 15.3% in serum testosterone level was noticed for the ashwagandha group when compared to placebo treated group.

**Muscle Strength:** The effect of KSM-66 Ashwagandha on muscle strength was measured through bench press and leg extension exercise (1RM). 138.7% and 52% increase in muscle strength was noticed for the bench press ( $P < 0.05$ ) and leg extension exercise ( $P < 0.05$ ) respectively as a result of ashwagandha supplementation.

**Muscle growth:** KSM-66 Ashwagandha supplementation caused improved muscle growth as measured for the thigh, arm and chest ( $P < 0.05$ ). At the end of the study, 8.1%, 17.1% and 3.3% increase in muscle size for thigh, arm and chest respectively were observed as a result of ashwagandha supplementation.

**Body fat percentage:** The group on KSM-66 Ashwagandha supplementation experienced a 19.1% reduction ( $P < 0.05$ ) in the average body fat.

**Muscle Recovery:** Muscle recovery was measured through reduction in serum creatine kinase level. KSM-66 Ashwagandha supplementation produced a significant reduction of 98.9% ( $P < 0.05$ ) in serum creatine kinase level compared to placebo group.

### MODES OF ACTION:

- Ashwagandha increases muscle size by promoting muscle growth through increasing testosterone levels in body.
- Ashwagandha resists reduction in muscle mass by decreasing the levels of cortisol, which is a catabolic agent.
- Ashwagandha may help the body improve its own natural production of steroids that in turn enhances the protein synthesis. Ashwagandha is also believed to accelerate the cell repair process in the body. This is helpful not only in anti-aging but also in faster recovery between sessions of exercise and physical activity.
- Ashwagandha promotes muscle recovery through its antioxidant effects that combats free radical damage both at the muscle and central nervous system levels, anti-inflammatory and analgesic effects and reduction in lactic acid and blood urea nitrogen.



## ❖ KSM-66 ASHWAGANDHA FOR FEMALE SEXUAL FUNCTION

**OBJECTIVE:** To evaluate the efficacy of KSM-66 Ashwagandha in improving the sexual functions in healthy females.

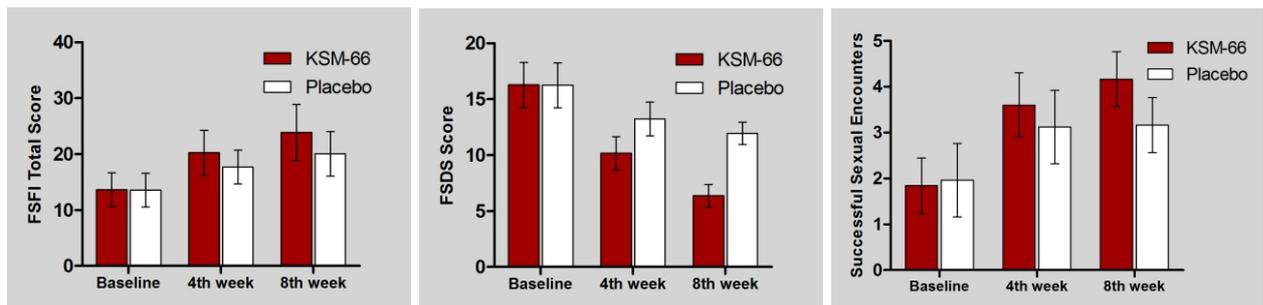
**DOSE:** 300 mg twice daily

**DURATION:** 8 Weeks

**NUMBER OF SUBJECTS :** 50 healthy female volunteers

**EFFICACY MEASURES :** The efficacy measures were the Female Sexual Function Index (FSFI) Questionnaire domain scores, the Female Sexual Distress Scale (FSDS) scores, and the number of total and successful sexual encounters.

### RESULTS:



**FSFI scores:** KSM-66 Ashwagandha caused noticeable improvement in sexual function among the female subjects. It produced 75.8% increase in total FSFI scores ( $P < 0.001$ ) from the baseline. The FSFI domain scores for Arousal, Lubrication, Orgasm and Satisfaction improved significantly by 62.4%, 59.4%, 82.4% and 62.4% respectively from the baseline score ( $P < 0.001$ ).

**FSDS scores:** KSM-66 Ashwagandha reduced sexual distress among the female subjects. The extract produced 60.9% reduction in FSDS scores from the baseline ( $P < 0.001$ ).

**Number of Total and Successful Sexual Encounters:** KSM-66 Ashwagandha caused 14.3% and 126.1% increase in the number of Total Sexual Encounters and Successful Sexual Encounters from the baseline respectively. During the study, KSM-66 Ashwagandha caused significant ( $P < 0.001$ ) increase in successful sexual encounters. However, it did not produce significant improvement in the number of total sexual encounters and FSFI domain for desire and pain.

### MODES OF ACTION:

- Female sexual dysfunction is associated with reduced libido, dryness in vagina, reduced genital perception, reduced arousal, pain during intercourse, problems to achieve orgasm and is majorly due to neuro-vascular, hormonal or psychogenic manifestations.
- Stress is associated with increase in cortisol in the blood, which in turn is associated with gonadal and sexual dysfunction. Under chronic stress women are less motivated and less desirous towards sexual activities. Excessive stress along with anxiety and fatigue leads to sexual arousal difficulties and vaginal pain.
- Ashwagandha helps in reducing the serum cortisol level by regulating HPA-axis function and improve homeostasis and balance in the body.
- The GABA mimetic action of Ashwagandha is responsible for stress reduction and producing calmness.
- In females, ashwagandha is thought to improve libido by increasing LH and reducing FSH and prolactin levels.
- Ashwagandha can elicit significant changes in gonadotrophin levels coupled with a significant increase in ovarian weight and profound folliculogenesis.



## ❖ KSM-66 ASHWAGANDHA FOR STRESS AND WEIGHT MANAGEMENT

**OBJECTIVE:** To evaluate the efficacy of KSM-66 Ashwagandha in reducing body weight in adults under chronic stress.

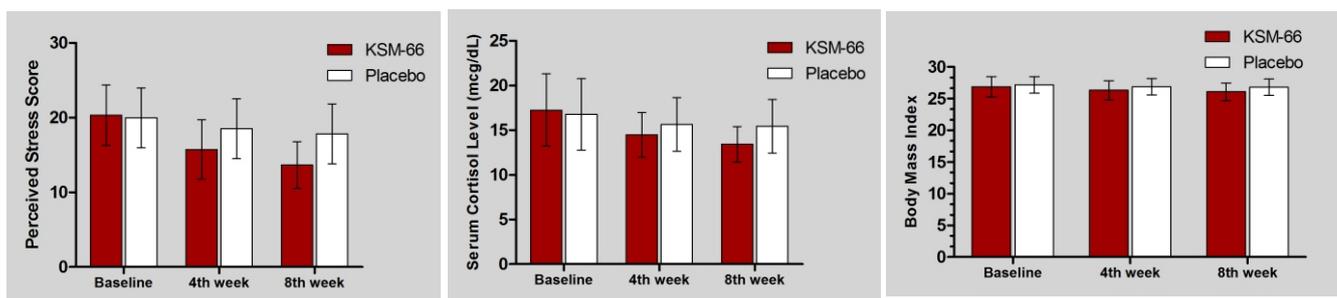
**DOSE:** 300 mg twice daily

**DURATION:** 8 Weeks

**NUMBER OF SUBJECTS :** 50 male healthy volunteers

**EFFICACY MEASURES :** The efficacy measures were Perceived Stress Scale (PSS) and Food Cravings Questionnaire (FCQ) scores, Oxford Happiness Questionnaire (OHQ) score, Three Factor Eating Questionnaire (TFEQ) domain scores, serum cortisol levels, bodyweight and body mass index (BMI).

### RESULTS:



**PSS scores:** KSM-66 Ashwagandha caused significant reduction ( $P < 0.05$ ) in Perceived Stress among the subjects. At the end of the study, KSM-66 Ashwagandha produced a 32.74% reduction in PSS scores from the baseline compared to placebo group.

**FCQ domain scores:** KSM-66 Ashwagandha reduced desire or cravings for food in the study subjects. The FCQ scores for Planning, Positive and Negative reinforcement, Lack of control, Emotion and Environment domains were reduced significantly ( $P < 0.05$ ) in the Ashwagandha supplemented subjects.

**Serum cortisol levels:** A statistically significant ( $P < 0.05$ ) decrease of 22.2% was observed in serum cortisol (a stress hormone) levels as a result of KSM-66 Ashwagandha supplementation compared to placebo group.

**Bodyweight and BMI:** KSM-66 Ashwagandha supplementation resulted in a 3.0% and 2.9% reduction in bodyweight ( $P < 0.05$ ) and BMI ( $P < 0.05$ ) respectively.

**OHQ and TFEQ scores:** Supplementation with KSM-66 ashwagandha resulted in a significant ( $P < 0.05$ ) increase in OHQ scores and a significant ( $P < 0.05$ ) reduction in TFEQ scores for 'Uncontrolled' and 'Emotional Eating behavior' compared to placebo group.

### MODES OF ACTION:

- Chronic stress is frequently accompanied by increase in serum cortisol and food cravings and decrease in dietary control and mental well-being, which are all associated with weight gain.
- Ashwagandha is seen as a GABA mimetic that reduces over-excitation of neurons, thereby producing calmness, reducing stress and increasing focus, mental well-being and self-control.
- The role of ashwagandha in promoting homeostasis and regulating HPA-axis function may be explained its role in the reduction of serum cortisol.
- Ashwagandha imparts positive impact on the eating behavior & normalize hunger.



## ❖ KSM-66 ASHWAGANDHA FOR MEMORY AND COGNITION

**OBJECTIVE:** To assess the effect of ashwagandha supplementation on working memory, immediate memory, general memory, visuospatial processing, executive function, attention and information processing speed.

**DOSE:** 300 mg twice daily

**DURATION:** 8 Weeks

**NUMBER OF SUBJECTS:** 51 healthy volunteers

**EFFICACY MEASURES :** Subtests of the Wechsler Memory Scale III: Logical Memory I and II, Verbal Paired Associates I and II, Faces I and Faces II, Family Pictures I and II, Letter-Number Sequencing, Spatial Span and Visual Reproduction I & II. The following standard cognitive battery tasks were also used: Shepard's mental rotation task, Erikson Flanker task, Wisconsin card sort test, Trail making test part A, Mackworth's sustained attention test.

### RESULTS:

WMS-III Logical Memory I (Immediate Memory)

	Ashwagandha Mean	Ashwagandha StdDev	Placebo Mean	Placebo StdDev	pvalue
Day0	8.62	2.04	9.00	2.56	0.5681
Day28	11.33	2.84	10.42	3.66	0.3286
Day56	12.75	3.73	11.04	3.41	0.0981
Change at Day28 from Baseline	2.71	2.51	1.42	2.77	0.0919
Change at Day56 from Baseline	4.12	2.69	2.04	2.55	0.0072

**WMS-III Immediate Memory subtests:** The WMS-III Immediate Memory subtests relate to the ability to recall within a few minutes of stimuli presentation, and are associated with learning ability. The improvement in immediate memory under KSM-66 Ashwagandha supplementation was supported by increases in the WMS-III subtests for Logical Memory I ( $P < 0.01$ ), Verbal Paired Associates I ( $P < 0.05$ ), Faces I ( $P < 0.05$ ), Family Pictures I ( $P < 0.01$ ).

**WMS-III General Memory subtests:** The WMS-III General Memory subtests relate to the ability to recall after substantial passage of time, which are associated with learning and productivity. The improvement in immediate memory under KSM-66 Ashwagandha supplementation was supported by increases in the WMS-III subtests for Logical Memory II ( $P < 0.01$ ), Verbal Paired Associates II ( $P < 0.05$ ), Faces II ( $P < 0.05$ ), Family Pictures II ( $P < 0.01$ ).

**WMS-III Working Memory subtests:** The WMS-III Working Memory subtests relate to the assessment of the memory system that facilitates the holding of information pieces mentally, long enough for immediate sequential actions. It is a mental scratchpad, that helps, for example, when one needs to hear a phone number and then dial it. There is mixed evidence on KSM-66 helping increase working memory. KSM-66 Ashwagandha supplementation increased scores on the Spatial Span subtest ( $P < 0.05$ ) but not the Letter-Number Sequencing subtest ( $P > 0.10$ ).

**Executive Function:** Executive function is a higher-order cognitive process that relates to the coordination, selection and execution of willful action. One of its roles is in interrupting automatic unproductive or undesirable processes that are under way and in discouraging impulses to stop a fruitful activity that the body is engaged in. Executive Function was evaluated via the Eriksen Flanker Task and Wisconsin Card Sort Test. KSM-66 supplementation improved performance with  $P < 0.01$  and  $P < 0.05$  respectively.

**Attention and Information Processing Speed:** This cognitive component governs the extent of time that the subject can receive information, filter out irrelevant information, focus on the relevant information, process that information and respond accordingly. KSM-66 improved performance for Trailmaking Test Part A ( $P < 0.05$ ) and Mackworth's Sustained Attention Test ( $P < 0.01$ ).

### MODES OF ACTION:

- Ashwagandha is seen to facilitate choline production in the body, which in turn influences key memory processes.
- As a GABA-mimetic agent, ashwagandha can decrease over-firing of neurons and increase the ability of the body to ignore distracting stimuli and improve executive function
- Increased cortical muscarinic acetylcholine receptor capacity has been observed in animals and humans with extracts of ashwagandha.



## KSM-66 ASHWAGANDHA FOR ANTI-AGING

**OBJECTIVE:** Evaluate the effect of KSM-66 Ashwagandha in enhancing lifespan of *Caenorhabditis elegans*.

**METHODS:** In this study, wild type *C. elegans* (N2) or RB918: *acr-16* (ok789); and NL2099: *rff-3* (pk1426) mutant worms were used. The lifespan assay of the worms is done after treating them with KSM-66 Ashwagandha.

### RESULTS:

Sample	Median Lifespan + Std. Dev
NGM	14±3(109)
NGM+ethanol	15±1.3(127)
NGM+PI-KSM-100ng/ml	17±3.14(213)

It has been observed that the wild type worms (mutant for the human nicotinic acetylcholine receptor, nAChR,  $\alpha 7$  equivalent, *acr-16*), showed around ~20% lifespan extension when treated with KSM-66 Ashwagandha. Therefore, KSM-66 Ashwagandha has successfully enhanced the lifespan of *C. elegans*.

### MODES OF ACTION:

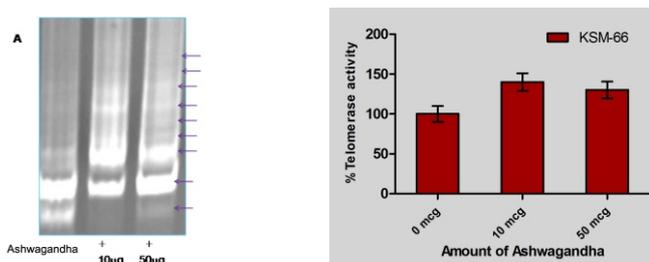
- Ashwagandha is an 'adaptogen' that increases the ability to adapt to environmental, physical and mental changes by modulating the metabolism and the body's processes.
- In Ayurveda & ancient folklores, ashwagandha has been claimed to possess a lifespan enhancing ability.
- Ashwagandha enhances telomerase activity which may be responsible for anti-aging activity and enhanced lifespan of *C. elegans*.
- Humans who live to very old age tend to experience low stress either due to environmental factors or due to internal resilience. The adaptogenic action of ashwagandha promotes resilience to stress. Ashwagandha in this way indirectly may promote longer life.

## KSM-66 ASHWAGANDHA AND TELOMERASE ACTIVITY

**OBJECTIVE:** Evaluate the effect of KSM-66 Ashwagandha to increase telomerase activity in HeLa cells, an in vitro human cell culture model.

**METHODS:** In this study the telomerase activity of KSM-66 Ashwagandha is determined through the Telomere Repeat Amplification Protocol (TRAP) assay in HeLa cells, an in vitro human cell culture model.

### RESULTS:



It has been observed that, KSM-66 Ashwagandha increased telomerase activity through TRAP assay, with highest enhancement of ~45% at 10-50 µg concentration. Thus, ashwagandha root extract has the anti-aging inducing potential.

### MODES OF ACTION:

- The KSM-66 Ashwagandha may elongate short telomeres and thereby enhance telomerase activity.



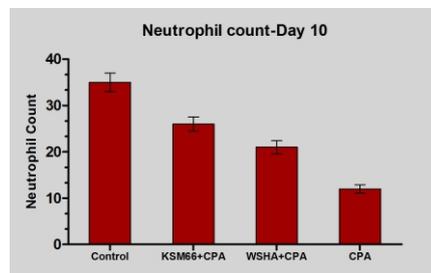
## ❖ KSM-66 ASHWAGANDHA AND IMMUNITY

**OBJECTIVE:** To evaluate the efficacy of KSM-66 Ashwagandha as an immunomodulator in Swiss Albino Mice in drug induced neutropenia.

### **METHODS:**

- 72 Swiss Albino Mice were randomized into control, cyclophosphamide (CPA), Withania somnifera hydro-alcoholic extract (WSHA) and KSM-66 groups.
- KSM-66 and WSHA treatment groups were administered with KSM-66 Ashwagandha and hydro-alcoholic extract respectively at a dose of 0.26 gm/kg body weight, orally, for 14 days.
- Day 8: CPA, WSHA and KSM-66 groups were administered with cyclophosphamide intramuscularly at dosage 200 mg/kg body weight.
- Day 10 and Day 15: Fasting blood samples collected from all animals for hematological analysis.

### **RESULTS:**



- KSM-66 Ashwagandha showed significant protective effect in drug induced neutropenia compared to WSHA and cyclophosphamide groups ( $P < 0.05$ ).
- KSM-66 Ashwagandha produced a significant increase in spleen lymphocyte proliferation and neutrophil count compared to other groups ( $P < 0.05$ ).

### **MODES OF ACTION:**

- Ashwagandha causes Selective stimulation of Th1 immunity by enhanced secretion of IFN-gamma and IL-2 and enhanced proliferation of CD4+/CD8+ and NK (natural killer) cells along with an increased expression of CD40/CD40L/CD80.
- Ashwagandha causes increase in the macrophage function which in turn increases the immunity against the intracellular pathogens and immune suppressed diseases.

## ❖ TOXICITY STUDIES ON KSM-66

**Acute oral toxicity study:** KSM-66 ashwagandha did not cause mortality and symptoms in the treated rats at any dosage level according to the Globally Harmonized System (GHM) ranking. The results revealed that KSM-66 neither caused any adverse effects, nor it produced any toxicity. It was found to be safe up to 2000 mg/kg dose level by oral route observed for 14 days.

**Sub-acute or 28 days repeated oral toxicity study:** KSM-66 ashwagandha did not cause mortality, symptoms and any other adverse effects in the treated rats at any dose level. The results revealed that KSM-66 has not produced any toxicity in the treated animals and was found safe up to 2000 mg/kg dose level by oral route given daily for 28 days.

**Genotoxicity acute and 28 days repeated dose study by Comet Assay:** It was observed that there was no significant increase in percentage tail DNA at all time intervals after treatment when compared to control. There was no evidence of genotoxicity by KSM-66 at any dose level in acute and 28 days repeated oral dose toxicity studies.



## LIST OF CURRENTLY ONGOING STUDIES ON KSM-66 ASHWAGANDHA

1. Efficacy of KSM66 Ashwagandha on quality of sleep in healthy adults
2. Efficacy of KSM66 Ashwagandha for perimenopausal symptoms in healthy women
3. Efficacy of KSM66 Ashwagandha for general health improvement in elderly subjects
4. Efficacy and safety of KSM66 Ashwagandha in reducing the effects of stress and anxiety (multi-continent study)
5. The effect of KSM-66 Ashwagandha on creatine, muscle size and muscle strength in athletes
6. Efficacy of KSM-66 Ashwagandha on  $VO_{2\max}$ , oxidative stress and cardiorespiratory endurance in athletes
7. The effect of KSM-66 Ashwagandha on sexual wellness in healthy male subjects.
8. The effect of KSM-66 Ashwagandha on subclinical hypothyroidism and the cortisol level.

## ASHWAGANDHA ADOPTION



KSM-66's maker, Ixoreal Biomed Inc., is pleased to partner with the American Botanical Council to be the adopter of the 'Ashwagandha' herb, under its "Adopt-an-Herb" program. Ixoreal helps the American Botanical Council keep its repository of research articles on ashwagandha up-to-date and aids the council in collecting and distributing research information on Ashwagandha.

## KSM-66 ASHWAGANDHA IS GRAS

KSM-66 is a self-affirmed GRAS (Generally Regarded as Safe) ingredient, qualified by a reputed panel of toxicologists



## SUBSTANTIATED STRUCTURE/FUNCTION CLAIMS

KSM-66 Ashwagandha's substantiated structure/function claims are in accordance with the requirements of the Dietary Supplement Health and Education Act of 1994 and have been submitted to the Food and Drug Administration. Backed by peer reviewed studies, numerous claims have been deemed acceptable for KSM-66. Some examples include:

### STRESS

- Helps reduce stress
- Helps promote a healthy response to everyday stress, over-work and fatigue
- Promotes relaxation without drowsiness
- Helps improve the quality of sleep
- Helps maintain normal cortisol levels to promote a healthy response to everyday stress
- Helps in calming down and relaxation of body and mind

### MEMORY AND COGNITION

- Helps improve learning performance and concentration
- Helps maintain mental alertness when experiencing fatigue or drowsiness
- Helps promote mental clarity, concentration and alertness
- Helps enhance mental focus
- Helps promote mental sharpness

### SEXUAL PERFORMANCE

- Helps arouse sexual desire
- Helps maintain sexual vigor and performance
- Helps the body maintain healthy levels of free testosterone in men
- Promotes sexual desire and vitality
- Promote overall well being and hormonal health
- Enhance sexual function

### WOMEN HEALTH

- Helps support a healthy response to common conditions associated with menopause
- Supports a normal healthy attitude during the menstrual cycle
- Helps diminish normal symptoms of PMS

### SPORTS FUNCTION

- Helps Boost stamina
- Helps increase muscle size and enhance muscle tone in men
- Helps to maintain balanced energy levels for physical performance and endurance
- Helps enhance sports performance
- Helps increase muscle strength in men
- Helps enhance the rate of muscle recovery in men

### WEIGHT MANAGEMENT

- Helps to enhance overall body composition when used as part of a healthy diet and exercise program
- Helps maintain normal weight by reducing stress induced over eating
- Helps control stress-related food cravings
- Helps support healthy weight maintenance.

\* The above statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease. These claims are based upon clinical studies. It is the responsibility of the manufacturer (licensee) to notify the FDA within 30 days, after first marketing a product with a structure/function claim that the statement(s) are being made, as required under section 403(r)(6) of the FD&C Act.



Stress Relief

Cognition

Muscle Strength

Endurance

Muscle Recovery

Male Testosterone

Sleep

Weight Management

Sexual Wellness

Muscle Mass

Memory

Thyroid Support

Women Health