

# Effect of Ashwagandha ghrita and Ashwagandha granules on lipid profile in albino rats

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**ABSTRACT :** Present study deals with the effect of Ashwagandha Ghrita and Ashwagandha Granules on serum lipid profile and tissues in normal rats. Four groups of six animals each were made for experiment. Test drug and vehicles were administered for fifteen consecutive days. Serum lipid profile and tissue cytoarchitecture were analyzed as per standard protocol. Administration of both the test formulations did not influence serum lipid profile and also did not alter cytoarchitecture of liver, heart, aorta and kidneys. From data generated during study, it can be concluded that the Ashwagandha Ghrita and Ashwagandha Granules do not have the potential to alter serum lipid profile.

**Key words :** Bruhmana, Ashwagandha Granules, Ashwagandha Ghrita, Lipid profile.

## INTRODUCTION

Ashwagandha is used as Rasayana since the ancient time especially for children in the management of malnourishment<sup>1</sup>. It is well documented that the Ghrita (medicated ghee) preparations are used as Rasayana. The Ghrita prepared from Ashwagandha was taken for clinical study to assess its Bruhmana effect in paediatric practice<sup>2</sup>. However administration of Ghrita preparation for children is very difficult, hence the granules form of Ashwagandha was prepared because of its palatability in paediatric practice and the comparative study was undertaken clinically to assess their Bruhmana property in children.

However many times medical opinion has been against use of medicated ghee on the basis of the generalization that being an animal fat it is saturated and it would raise serum cholesterol, which in turn increase the risk of atherosclerosis. Thus the present study is directed towards assessment of effect of Ashwagandha ghrita on serum lipid profile in experimental animals. Also, as Ashwagandha granules is claimed to possess Bruhmana properties, their chronic administration may produce elevation in the lipid profile of the individuals. Hence its effect on serum lipid profile in normal albino rats was carried out.

## MATERIAL AND METHODS

### Test formulations :

Ashwagandha granules and Ashwagandha ghrita- The two formulations were prepared at the Pharmacy of

Gujarat Ayurved University, Jamnagar by adopting standard procedures.

### Animals :

Wistar strain albino rats of either sex weighing between 180-220g were selected for the study from the animal house attached to the institute. They were housed at  $22 \pm 2^\circ\text{C}$  with constant humidity 50 - 60%, on a 12 h natural day and night cycles. They were fed with diet Amrut brand rat pellet feed supplied by Pranav Agro Industries and tap water *ad libitum*. The experiments were carried out in accordance with the directions of the Institutional Animal Ethics Committee (IAEC).

### Dose selection & schedule :

The dose of the test drugs were calculated by extrapolating the human dose to animals (550mg/kg) based on the body surface area ratio by referring to the standard table of Paget & Barnes, (1969)<sup>3</sup>. The test drug Ashwagandha granules was suspended in tap water (550mg/5ml) and administered orally at a volume of 0.5 ml/100g body weight. Ashwagandha ghrita was weighed in required quantity, slightly warmed to liquify it and administered to animal based on body weight. The drugs were administered orally with the help of gastric catheter of suitable size sleeved on to a syringe nozzle. The animals of two control groups water and Go-ghrita received equal volume of plain tap water and Go-ghrita respectively.

### Statistical analysis :

Student's t test for unpaired data has been used for analyzing the data generated during the study. The values of Ashwagandha granules and Ashwagandha ghrita were compared with their respective vehicle

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control groups viz. water and Go-ghrita groups. A 'p' value less than 0.05 is considered as statistically significant and the value of  $p < 0.01$  or  $p < 0.001$  is considered statistically highly significant. Level of significance was noted and the results interpreted accordingly.

#### Study protocol :

The Wistar strain albino rats selected were weighed and divided into four groups, first group received water served as control and second group received Ashwagandha granules. The third group received Go-ghrita, served as ghrita control group whereas fourth group received Ashwagandha ghrita. The vehicles and test drugs were administered to the respective groups for 15 consecutive days. On 16<sup>th</sup> day the animals were weighed again and sacrificed by giving over dose of ether anaesthesia and the blood was collected and sent for biochemical investigations like serum total cholesterol<sup>4</sup>, serum triglyceride<sup>5</sup>, LDL, blood sugar<sup>6</sup>, blood urea<sup>7</sup>, serum creatinine<sup>8</sup> and total protein<sup>9</sup>. Liver, kidney and heart were carefully dissected, cleaned of extraneous tissue and their weight was noted. After weighing, these organs were transferred to 10% formalin solution for fixation - liver; heart, kidney and aorta were subjected to histopathological study by referring standard procedure<sup>10</sup>. The slides were viewed under Trinocular Research Carl Zeiss Microscope (Germany) at various magnifications to note down the changes in the microscopic features of the tissues studied.

#### RESULTS

Table No. 1 shows the effect Ashwagandha granules and Ashwagandha ghrita on body weight (g) and organ weight (g/100g body weight) of Wistar rats. The data presented as Mean  $\pm$  SEM where 6 animals in

each group. A 'p' value less than 0.05 is considered as statistically significant.

Data pertaining to effect of test formulations of Ashwagandha ponderal changes on normal rats is given in Table No. 1. Test drug administration did not alter the body weight as well as weight of heart, kidney and liver to significant level. A marginal decrease in weight of liver and heart was observed in both the test drug administered group in comparison to their respective vehicle control groups.

Table No. 2 shows the effect of Ashwagandha granules and Ashwagandha ghrita on various biochemical parameters of Wistar rats. The data presented by Mean  $\pm$  SEM where 6 animals in each group. A 'p' Value less than 0.001 is considered as statistically highly significant.

Table No. 2 shows data related to effect of test formulations on important serum biochemical parameters. Both the formulations did not alter most of the serum biochemical parameters to significant in comparison to their respective vehicle control groups except serum triglyceride and VLDL levels. In Ashwagandha granules administered rats a statistically significant decrease in serum triglyceride and VLDL was observed. In Ashwagandha ghrita treated group a marginal elevation of these parameters was observed, however it is statistically non-significant.

Microscopic examination of heart and aortic sections from different groups showed normal cytoarchitecture in comparison to their respective control groups. Microscopic examination of the sections of the liver and kidney showed features of normal cytoarchitecture in normal control and test drug administered groups. In Go-ghrita administered group mild fatty changes were observed in some rats.

TABLE NO. 1 : PONDERAL CHANGES :

Parameters	Water control	Ashwagandha granules	Ghee control	Ashwagandha ghrita
<b>Body weight (g)</b>				
Initial	222.66 $\pm$ 13.12	231.66 $\pm$ 15.36	211.20 $\pm$ 15.86	202.80 $\pm$ 15.54
Final	242.16 $\pm$ 11.39	252.80 $\pm$ 14.17	230.40 $\pm$ 14.48	218.40 $\pm$ 14.48
Difference	19.50 $\pm$ 04.40	17.80 $\pm$ 06.78	19.20 $\pm$ 04.20	15.60 $\pm$ 04.53
<b>Organ weight (g)</b>				
Liver	3.400 $\pm$ 0.19	3.009 $\pm$ 0.18↓	3.369 $\pm$ 0.11	3.021 $\pm$ 0.26↓
Heart	0.325 $\pm$ 0.14	0.297 $\pm$ 0.04↓	0.301 $\pm$ 0.06	0.269 $\pm$ 0.02↓
Kidney	0.593 $\pm$ 0.13	0.593 $\pm$ 0.05	0.614 $\pm$ 0.08	0.583 $\pm$ 0.80

Data : Mean  $\pm$  SEM; ↓ - Decrease

TABLE NO. 2 : BIOCHEMICAL PARAMETERS :

Parameters (mg/dl)	Water control	Ashwagandha granules	Ghee control	Ashwagandha ghrita
Blood sugar	104.67 ± 03.01	107.00 ± 02.85	113.00 ± 02.70	107.60 ± 03.67
Total cholesterol	78.00 ± 13.80	65.33 ± 02.37	93.60 ± 11.98	74.80 ± 06.41
S. triglyceride	117.50 ± 15.53	062.50 ± 9.16↓#	112.80 ± 21.60	131.40 ± 07.11
VLDL	40.17 ± 04.45	12.50 ± 01.83↓£	22.64 ± 04.39	26.28 ± 01.42
Blood urea	41.33 ± 01.50	36.50 ± 03.17	35.00 ± 01.30	30.40 ± 02.82
S. creatinine	00.78 ± 00.06	00.78 ± 00.05	00.74 ± 00.07	00.78 ± 00.04
T. protein	08.30 ± 00.15	08.10 ± 00.28	07.56 ± 00.17	07.72 ± 00.23

↓ : Decrease, £ : p<0.001 # : p<0.01

## DISCUSSION

Ghrita is one among the best Ajasrika Rasayanas. It is Ayu Vardhaka, Balavardhaka, Ojovardhaka, Vayasthapaka, Dhatu-poshaka and is supreme in Snehana Dravyas<sup>11</sup>. By virtue of Yogavahitva, as per its ingredients the medicated Ghrita will be attaining properties<sup>12</sup>. Recent studies revealed ghee contains 8% lower saturated fatty acids<sup>13</sup> which makes it easily digestible. Due to having 4-5% linoleic acid, an essential fatty acid, it promotes proper growth of human body. Ghee is lipophilic and this action of ghee facilitates transportation of ingredients of formulation to target organ and final delivery inside the cell, because cell membrane also contains lipids. In general ghee is one of the easily digestible and assailable food which provides essential nutrients and critical anti oxidants or free radical scavengers to human body for its protection and growth.

It is well established fact that use of cow ghee does not increase cholesterol. Recent studies have shown that a traditional cooking fat like pure ghee is healthier due to an ideal ratio of omega 6 to omega 3 fatty acids. Kumar *et al* (2000)<sup>14</sup> suggest that hypocholesterolemic effect of ghee is mediated by increasing the secretion of biliary lipids. Ghee is observed to improve the growth rate and digestibility. Some animal studies have shown the protein casein present in butter elevates cholesterol, but it is removed along with water content by heating the butter just over 100°C to get pure ghee after filtration of residue. In present study the feeding of the test formulations did not alter the body weight and weight of liver, heart and kidney in comparison to their respective control groups. Serum cholesterol level in Ashwagandha granule administered group were not elevated in comparison to water control group. However its elevation was observed in Ghrita control group. On the contrary a moderate but statistically non-significant decrease was observed in Ashwagandha Ghrita administered group. However

surprisingly with respect to serum triglycerides level a difference in the activity profile is observed. In Ashwagandha granules administered rats a statistically significant decrease was observed. In contrast to this in Ashwagandha ghrita treated group a marginal elevation was observed. This may be due to the additional ghee in the preparation. Triglyceride level indicate VLDL metabolism. Decrease in serum triglycerides level is indicative of decreased formation and increased utilization. Ashwagandha *per se* may have enhancement of triglycerides utilization in the body leading to decrease in its level in serum. This effect is attenuated when it is given in the form of ghee. Blood urea, serum creatinine, protein and blood sugar levels did not show any difference indicating that whatever tissue building effect is observed it does not affect normal functioning of the important organs. As a complement to the above parameters histological studies were undertaken on liver, heart, kidney and aorta, which did not show any significant changes in the cytoarchitecture.

## CONCLUSION

Data generated during the study shows chronic administration of Ashwagandha ghrita and Ashwagandha granules did not potentiate lipid profile in the experimental animals.

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## हिन्दी सारांश

### अश्वगंधा घृत एवं अश्वगंधा ग्रेन्यूल्स का अल्बिनो चूहों के लिपिड प्रोफाईल पर प्रभाव

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अश्वगंधा घृत एवं अश्वगंधा ग्रेन्यूल्स का अल्बिनो चूहों के सीरम लिपिड प्रोफाईल एवं कोशिका-ऊतकों पर प्रभाव का अध्ययन किया गया। परीक्षण हेतु प्रत्येक छः प्राणियों (चूहों) के चार वर्ग लिये गये। उन्हें औषधि एवं अनुपान नियमित रूप से १५ दिनों तक दिया गया। तदनंतर उनके सीरम लिपिड प्रोफाईल और ऊतकों की कोशिका संरचना का मानक विधि से परीक्षण किया गया। उपरोक्त परीक्षण द्वारा यह पाया गया कि दोनों औषधियों का सेवन सीरम लिपिड प्रोफाईल एवं यकृत, हृदय, महाधमनी व वृक्कों की कोशिकीय संरचना पर कोई परिवर्तन नहीं करता है। प्रस्तुत परीक्षण से उत्पन्न तथ्यों से निष्कर्ष निकाला जा सकता है कि अश्वगंधा घृत और अश्वगंधा ग्रेन्यूल्स, सीरम लिपिड प्रोफाईल पर प्रभावी परिवर्तन उत्पन्न नहीं करते हैं।

गुजरात आयुर्वेद युनिवर्सिटी