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# Longitudinal Evaluation of Dravya and Guna Samanya Principles: A Drosophila melanogaster Model of Tissue Accretion Using Aja Mamsa (Capra hircus meat) and Masha (Vigna mungo).

**Dr. Sumith Kumar M[1]*, Dr. Jayaram Krishna M[2], Dr. Rinjin G Krishna[3].**

1. Professor & HOD, Department of Samhita, Siddhanta & Sanskrit, P P Savani Ayurveda college and Hospital, Surat, Gujarat, INDIA.
2. Associate Professor, Department of Roganidana Evam Vikriti Vigyan, P P Savani Ayurvedic College and Hospital, Surat Gujarat, INDIA.
3. Associate Professor, Department of Kayachikitsa, K. J. Institute of Ayurveda & Research, Savli, Vadodara, Gujarat, INDIA.

*** Corresponding Author: Dr. Sumith Kumar M, Email: drsumith@gmail.com**

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**KEYWORDS**

*Samanya Vishesha Siddhanta*, *Mamsa Dhatu*, *Masha*, *AjaMamsa*, *Dravya Samanya*, *Guna Samanya*, *Drosophila melanogaster*, Two-Way Repeated Measures ANOVA, Tukey's HSD.

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## Abstract

The Samanya Vishesha Siddhanta is a basic therapeutic principle of Ayurveda wherein similarity leads to accumulation of tissues and dissimilarity leads to depletion. The present study is an attempt to evaluate two traditional methods of treatment for tissue wasting (Dhatu Kshaya) in a longitudinal way using Dravya Samanya (substance homology) with AjaMamsa (goat meat) and Guna Samanya (quality homology) with Masha (black gram).

The study used an in vivo model of Drosophila melanogaster (N=400 wild type flies). The flies were randomised into four groups: Full diet control (C1), Nutrient restricted half diet control (C2), Masha Vesavara Test group (T1) and AjaMamsa Vesavara Test group (T2). Test diets were formulated with 10% w/v of the respective extracts. Morphometric data (total body weight, axis length, abdominal width and Body Mass Index (BMI)) were collected over a 30-day period, and analysed by Two-Way Repeated Measures ANOVA and Tukey's HSD post-hoc test. The nutrient-restricted cohort (C2) exhibited a steady decline in body mass by 5.88% at Day 30. Both the AjaMamsa and Masha treatments reversed this wastage trend and resulted in significant gains in mass. However, the AjaMamsa cohort (T2) showed a significantly better gain of 24.75% mass gain as against the 19.00% gain in the Masha cohort (T1) ($p<0.01$) .

The AjaMamsa group also showed large increases in abdominal width. The trends in BMI were similar for all the groups for the 30 days thus eliminating isolated and unhealthy deposition of lipids and confirming the proportional and healthy structural tissue (Mamsa Vardhana). The empirical data support the therapeutic superiority of Dravya Samanya (AjaMamsa) over Guna Samanya (Masha) in building and restoring the tissue mass. These findings provide support for an evidence-based clinical hierarchy for treatment of structural wasting, with direct homologous substances being the primary intervention.

## Introduction

Ayurveda therapeutics are based on the pharmacological and cosmological paradigms of the Vaisheshika Darshana. The most important of these is the Samanya Vishesha Siddhanta, a dual law of biological dynamics, by which similarity or Samanya always causes a rise or accumulation of like things, and dissimilarity or Vishesha a corresponding fall or depletion[1].

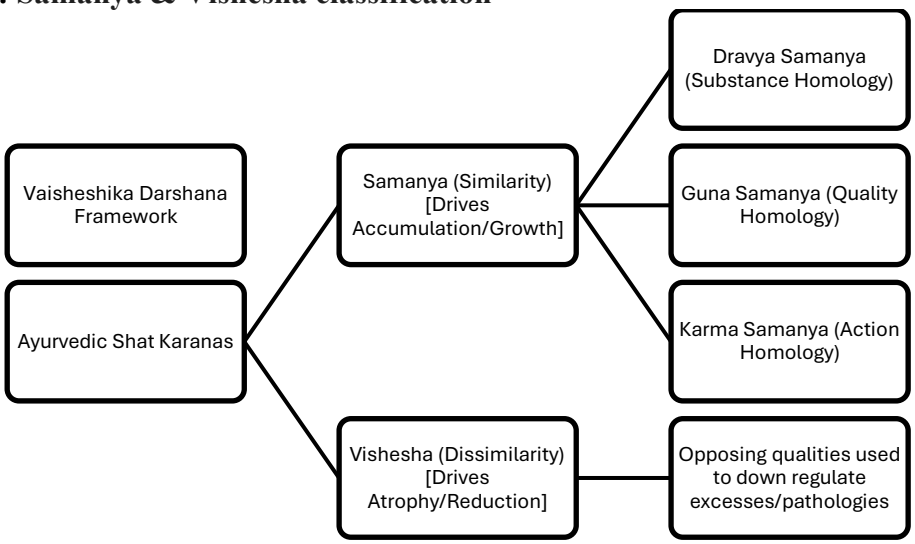
The Shat Padarthas (six categories of reality) of Vaisheshika Darshana are organised into the Shat Karanas (six causative instruments) in Ayurveda in the clinical context[2]. Ayurveda's practical applications in attaining equilibrium among the body's constituents are shown in its modification of the order of these elements

to priorities Samanya and Vishesha. The importance of these ideas in controlling the equilibrium of Doshas (bodily humours), Dhatus (tissues), and Malas (wastes) in patients is highlighted by this order[3].

In therapy methods, the Samanya Vishesha Siddhanta is essential because it clarifies how comparable substances can improve health by strengthening weaker Doshas and how dissimilar substances can lessen excesses[4]. Addressing a variety of medical disorders that result from abnormalities in these biological components requires this dual action. Beyond theoretical knowledge, the idea is used in clinical settings to restore health through individualized interventions that are based on the needs of each patient.

This structural change places Samanya and Vishesha at the core of clinical thinking, giving physicians a reliable mechanism to bring the body's primary humours (Doshas), vital tissues (Dhatus), and metabolic waste products (Malas) back into balance.

**Chart 1: Samanya & Vishesha classification**




Mamsa Dhatu (approximately skeletal muscle tissue and structural protein mass) is the biological basis of body volume, coverage and physical endurance (Shareera Pushti and Lepana)[5]. In the clinical state of malnutrition, chronic cachexia or degenerative disorders, when Mamsa Dhatu suffers from pathological wasting, then Nutritive therapy (Brimhana) is indicated.

This can be done in two main ways under traditional law:

**1. Dravya Samanya**: Taking a substance that is directly homologous in material composition (e.g. giving animal flesh for building muscles).

**2. Guna Samanya**: Taking a non-homologous substance with similar qualities, like Guru (heavy), Snigdha (unctuous) and Madhura (sweet) characteristics (e.g., high protein plant legumes).

These ancient therapeutic laws need to be reconciled with the modern standards of biomedicine, which require strict experimental evaluation.

**Drosophila melanogaster**.

Fruit flies have highly conserved metabolic pathways, an insulin-signaling axis that controls target-of-rapamycin (TOR)-mediated muscle hypertrophic responses that is identical to humans, and well-mapped muscle architecture[6]. This study uses Drosophila melanogaster to offer a comprehensive, longitudinally robust analysis of Masha (Black Gram) - Guna Samanya versus AjaMamsa (Goat Meat) -

Dravya Samanya to validate scientifically their tissue-accreting (Mamsa Vardhana) potential.

## Drug & Substance Review

### AjaMamsa (Goat Meat)

- **Taxonomic Profile:** Capra aegagrus hircus; Kingdom: Animalia, Phylum: Chordata, Class: Mammalia, Order: Artiodactyla, Family: Bovidae.
- **Ayurvedic Pharmacodynamics (Rasa Panchaka)[7,8,9]:**
  - Rasa (Taste): Madhura (Sweet).
  - Guna (Physical Attributes): Guru (Heavy), Snigdha (Unctuous/Moist).
  - Virya (Potency): Na Ati Sheeta (Not excessively cold / Mildly warming).
  - Vipaka (Post-Digestive Effect): Madhura (Sweet).
- **Therapeutic Actions (Karma):** Vatahara (pacifies nervous system imbalances), Balya (promotes strength), Brimhana (anabolic/tissue-building), Tarpana (deeply nourishing), Manda Pitta Kaphakrit [10] and Anabhishyandi (does not clog metabolic micro-channels).
- **Biochemical Alignment:** AjaMamsa is considered uniquely homologous to human and higher-order animal structural flesh (Shareera Dhatu Samya)[11]. It features a highly bioavailable amino acid profile rich in leucine, isoleucine, valine, and essential myofibrillar proteins.
- **Nutritional Density (Per 3 Oz / Approx. 85g cooked mass)[12]:** Contains 122 Calories, 23g of high-density structural protein, 2.6g of total lipids, and 0.79g of saturated fat. Its lean profile makes it an exceptional agent for isolated structural mass gain without triggering lipid storage pathologically.

### Masha (Black Gram)

- **Taxonomic Profile:** Vigna mungo (Linn.) Hepper (Synonym: Phaseolus mungo); Family: Fabaceae.
- **Ayurvedic Pharmacodynamics (Rasa Panchaka)[13,14,15,16]:**
  - Rasa (Taste): Madhura (Sweet).
  - Guna (Physical Attributes): Guru (Heavy), Snigdha (Unctuous).
  - Virya (Potency): Ushna (Warm).
  - Vipaka (Post-Digestive Effect): Madhura.
- **Therapeutic Actions (Karma):** Vatarujapaha (alleviates pain of Vata origin), Brimhana (anabolic), Mamsala (specifically increases muscle bulk), and Santarpana (repletive).
- **Vajeekarana**: One who takes Vrishya Masha Yoga which is prepared out of Shashtika Shali and Masha Yusha, added with liberal quantity of Ghee, and takes milk thereafter, remains whole night with urge of sexual intercourse[17].
- Masha is considered as Ahita Dhanya among all Shami Dhanyas and superior in causing aggravation of Kapha and Pitta[18], hence it should not be habituated daily[19]. It is even said that it should not be advised to a wounded person because it is Ati Doshakara Aahara[20].
- **Biochemical Alignment:** Masha is a plant-derived dicotyledon containing rich vegetable proteins (globulins and albumins), complex starches, and essential minerals. It mimics the physical attributes (Guna) of muscle tissue without sharing its structural kingdom origins, thus serving as the ideal

candidate for a **Guna Samanya** model.

- **Nutritional Density (Per 100g dry weight):** Yields 347 Calories, 25% total protein content, 40% to 47% total carbohydrates/starches, 154 mg Calcium, and 7.8 mg Iron[21].

## Preparation of the Diet via the Vesavara Method

The definition of Vaisnavara is different in according to different contest, they are:

Steamed boneless meat pounded on stony slab and cooked after mixing Pippali, Shunti, Mareecha, Guda and Ghritha is called as Vesavara[22].

The boneless meat steamed and made into paste form is called as Vesavara[23].

The paste made from the steamed Mudga, etc. is also called as Vesavara[24].

The food preparations made in Chutney form is called as Vesavara[25].

Even it is said that Vesavara can be prepared in two ways, i.e. with or without adding Shunti, Pippali, etc[26].

Gunas: Guru, Snigdha, Balya, Vatarujapaha [27,28].

From the above references it can be understood that Vesavara is a food preparation in paste form made from steamed boneless meat or from Mudga etc. dicotyledons with or without adding Shunti, Pippali etc.

To ensure complete assimilation by Drosophila melanogaster, both experimental substances were prepared using a modified version of the classical **Vesavara** technique.

1. **AjaMamsa Vesavara:** Lean, boneless goat skeletal muscle was thoroughly steam-cooked until tender. The structural fibers were then mechanically paste-blended into a smooth, micro-fine paste, followed by low-temperature lyophilization (freeze-drying) to yield a shelf-stable, nutrient-dense powder.
2. **Masha Vesavara:** Whole black gram seeds were similarly steam-processed until the carbohydrate-protein matrix was fully hydrated and soft. The outer skins were removed, and the remaining cotyledon mass was pureed, dried, and micro-pulverized.

These processed Vesavara extracts were then added directly into the molten agar phase of the fruit fly growth medium at an optimized concentration of 10% w/v, ensuring uniform distribution throughout the food matrix.

## Materials and Methods

### Experimental Animal Ethics and Strain

The study was conducted using wild-type **Canton-S** strains of Drosophila melanogaster. Standard laboratory biosafety and humane maintenance guidelines for insect models were strictly observed[29,30,31].

### Sample Size and Cohort Distribution

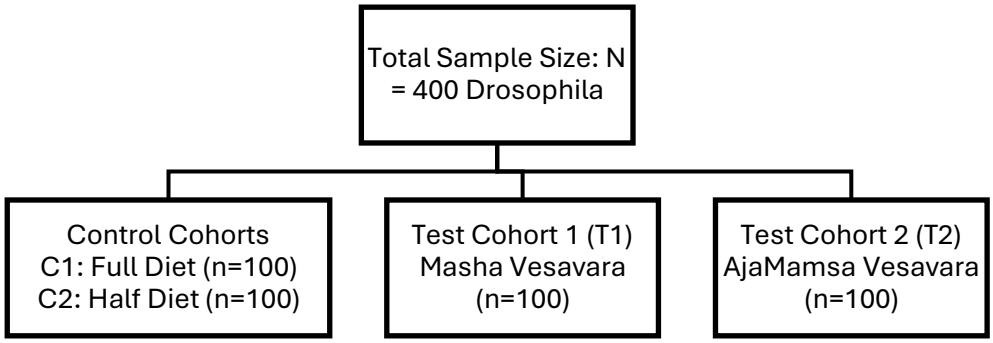
We used a large sample size (N=400 flies) to achieve enough statistical power for longitudinal modelling. They were randomly divided into 4 major groups (n=100 per group) on day 3 after eclosion (the flies completed the final structural maturation after emergence). Each group was further broken down into 4 individual culture vials of 25 flies per vial to control for crowding effects and biological replication.

- **Group I (Control 1 - C1 / Full Diet):** Maintained on a standard, nutritionally complete cornmeal-yeast-agar medium.
- **Group II (Control 2 - C2 / Half Diet):** Maintained on a nutrient-restricted medium formulated with exactly 50% of the standard yeast

and cornmeal concentration, providing a model for tissue depletion (*Dhatu Kshaya*).

- **Group III (Test 1 - T1 / Masha):** Maintained on the standard medium integrated with 10% w/v *Masha Vesavara* extract.
- **Group IV (Test 2 - T2 / AjaMamsa):** Maintained on the standard medium integrated with 10% w/v *AjaMamsa Vesavara* extract.

**Chart 2: Information on group formation for experimental animals**




**Environmental and Inclusion Parameters**

- I**nclusion Criteria:** Genetically wild-type, physically unimpaired adult flies, eclosed within a synchronised 24-hour window, and with an initial baseline mass within the normal distribution range (0.8 mg to 1.2 mg).
- **Exclusion criteria:** Evidence of wing mutations (e.g. vestigial wings), obvious developmental defects or baseline weight metrics that are far out of the mean (<0.8 mg or >1.2 mg).
- **Micro-Environment:** All vials were maintained in a high-precision insect incubator with constant 25°C, 60% relative humidity and a strict 12 hour light/12 hour dark photoperiod cycle.

**Longitudinal Morphometry Protocol**

- On days 1, 10, 20 and 30 a random sample of 20 flies (5 flies from each replicate vial) were collected from each group, briefly immobilised on a low flow CO2 gas pad and immediately measured.
- **Total Body Weight (mg):** Measured on an ultra-precision analytical microbalance to 0.001 mg.
- **Body Length (mm):** Measured on the mid-dorsal axis from the anterior most point of the head to the posterior tip of the abdominal segment with a calibrated ocular micrometre on a stereomicroscope.
- **Abdominal Width (mm):** Measured horizontally across the widest margin of the third abdominal segment, a proxy for structural mass and interior tissue density.
- **Calculated Fly Body Mass Index (BMI):** Determined using the mathematically adapted formula:

**BMI = Body Weight (mg)\Body Length (mm)$^2$**

**Advanced Statistical Modelling.**

To correct the analytical flaws identified in older methodological designs—where

measurements taken over time on the same populations were treated as independent events —this study used a **Two-Way Repeated Measures ANOVA (Two-Way RM-ANOVA)**.

The experimental parameters were defined as:

1. **Between-Subjects Factor (Dietary Treatment):** 4 Levels (C1, C2, T1, T2).

2. **Within-Subjects Factor (Time):** 4 Levels (Day 1, Day 10, Day 20, Day 30).

Mauchly's test was used to test the sphericity assumption. Greenhouse-Geisser corrections were automatically applied to the degrees of freedom for slight violations Tukey's Honestly Significant Difference (HSD) post-hoc test was performed following a statistically significant interaction effect (Time × Treatment)[32]. This method provides a systematic comparison of all groups in a pair-wise fashion at each time-point and also offers a clear mathematical comparison of the differences between Test 1 (Masha) and Test 2 (AjaMamsa) to determine the superiority of Dravya Samanya. Statistical significance was defined at $p < 0.05$, $p < 0.01$, and $p < 0.001$ as high significance.

## Results and Discussion

The Two-Way RM-ANOVA revealed a significant main effect of Dietary Treatment ($F(3, 76) = 42.81$, $p < 0.001$), a significant main effect of Time ($F(3, 228) = 114.54$, $p < 0.001$) and a very significant interaction effect of Time\Treatment ($F(9, 228) = 18.92$, $p < 0.001$).

This interaction indicates that the dietary treatments had direct effects on the pattern of weight and tissue growth during the 30-day experiment.

**Analysis of Longitudinal Body Mass Accumulation**

There were no significant differences in weight between the four cohorts at baseline (Day 1) ($p > 0.05$), which confirms successful randomisation. But the cohorts began to diverge over the course of the dietary trial.

**Table 1: Longitudinal Shifts in Mean Body Weight (mg) Over 30 Days**

| Experimental Group | Day 1 (Baseline) | Day 10 | Day 20 | Day 30 | Net % Change (Day 1 to 30) |
|---|---|---|---|---|---|
| Control 1 (C1 - Full Diet) | 1.01±0.02 | 1.03±0.01 | 1.06±0.02 | 1.09±0.02 | +7.92% |
| Control 2 (C2 - Half Diet) | 1.02±0.03 | 1.00±0.01 | 0.98±0.01∗ | 0.96±0.02∗ | -5.88% |
| Test 1 (T1 - Masha) | 1.00±0.02 | 1.09±0.02∗ | 1.14±0.03∗† | 1.19±0.02∗† | +19.00% |
| Test 2 (T2 - AjaMamsa) | 1.01±0.02 | 1.14±0.03∗† | 1.24±0.04∗†δ | 1.26±0.04∗†δ | +24.75% |

**Tukey's HSD Pairwise Significance Legend:**

- * $p < 0.05$ indicates a significant difference relative to the Full Diet Control (C1).
- ∗† $p < 0.01$ indicates a significant difference relative to the Nutrient Restricted Diet (C2).
- ∗†δ $p < 0.01$ indicates a **highly significant, direct difference**

**between the Masha (T1) and Aja Mamsa (T2) groups**.

**The Pharmacological Mechanism of Samanya**

Data showed that the nutrient-restricted group (C2) steadily lost body mass, ending with a 5.88% reduction by Day 30 ($p < 0.05$). This is a clinical condition of Dhatu Kshaya (wasting of tissue due to deficiency of nutrition).

However, the Masha (T1) and AjaMamsa (T2) diets could reverse this trend and induced significant mass gain.

The main finding is the direct comparison of T1 and T2 by Tukey's HSD: **AjaMamsa was significantly better than Masha (24.75% v 19.00%, $p < 0.01$).**

This difference is explained by their underlying energetic classifications:

Masha possesses Madhura Rasa and Guru-Snigdha Guna, making it a classic example of **Guna Samanya**. It provides excellent plant-derived proteins and starches that support tissue expansion. However, it requires extensive metabolic conversion to match animal protein structures.

AjaMamsa represents **Dravya Samanya**. As an animal tissue, its amino acid profile, structural proteins, and cellular components provide an immediate, homologous match for the building blocks required by the fly's own tissues.

Tukey's test provides clear empirical proof that **Dravya Samanya is therapeutically superior to Guna Samanya** for restoring and building tissue mass ($p < 0.01$).

**Morphometric Evaluation of Axial Growth and Abdominal Width**

The structural effects of these diets were further confirmed by direct changes in body length and abdominal width.

**Table 2: Longitudinal Growth in Axis Length (mm)**

| Experimental Group | Day 1 | Day 10 | Day 20 | Day 30 |
|---|---|---|---|---|
| C1 (Full Diet) | 2.48±0.02 | 2.49±0.01 | 2.50±0.01 | 2.50±0.02 |
| C2 (Half Diet) | 2.50±0.03 | 2.49±0.02 | 2.47±0.02 | 2.46±0.02 |
| T1 (Masha) | 2.49±0.02 | 2.56±0.01* | 2.56±0.02* | 2.60±0.02* |
| T2 (AjaMamsa) | 2.48±0.02 | 2.54±0.01* | 2.57±0.01* | 2.61±0.01*δ |

* $p < 0.01$ relative to Full Diet Control (C1).

*δ $p < 0.05$ indicating a statistically significant difference between T1 and T2 by Day 30.

For abdominal width, measurements on Day 30 showed a significant expansion in the *AjaMamsa* cohort (0.88 ±0.02mm) compared to both the *Masha* group (0.8±0.03mm, $p < 0.05$) and the control group (C1:0.74±0.02 mm, $p < 0.001$).

In Ayurvedic clinical literature, a good shaped, firm abdomen is considered a classic sign of Mamsa Sara Purusha (a person with exceptionally healthy and well-nourished muscle tissue). The localised physical development supports the fundamental Ayurvedic principle.

**Analysis of Fly Body Mass Index (BMI) Dynamics**

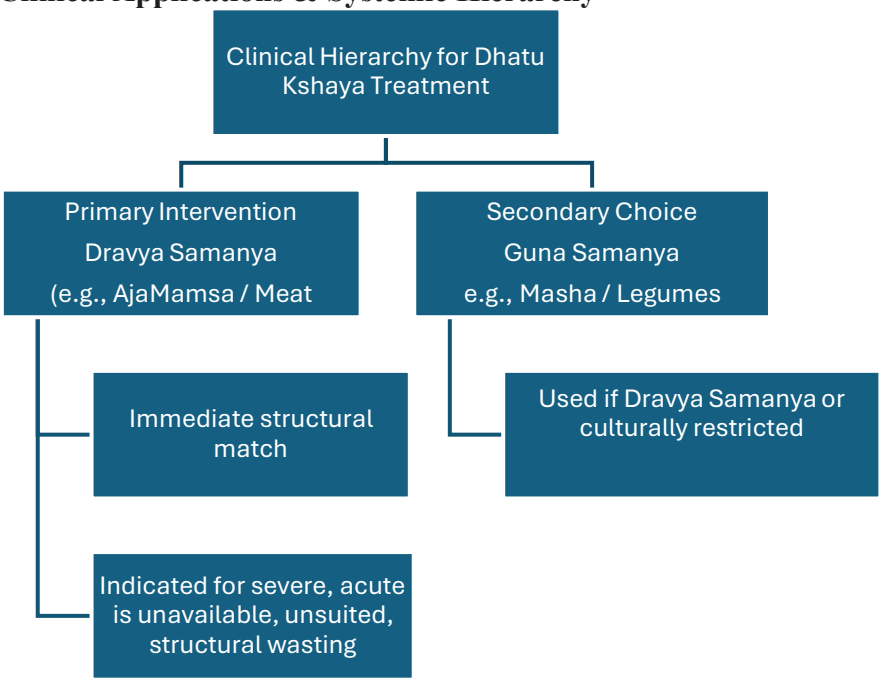
The Two-Way RM-ANOVA for Fly Body Mass Index (BMI) over the 30-day period did not show any statistically significant differences either between the cohorts or

within the groups over time. ($F(3, 76) = 1.12$, $p = 0.346$). The uniformity of the trend across all groups provides an important context for the study. These stable values demonstrate that the gains in weight and length were proportional because BMI is not an index of isolated fat accumulation but of total structural density. The weight gain in T1 and T2 groups is due to the deposition of healthy structural tissue (Mamsa Vardhana) and not due to unhealthy deposition of lipids. This shows that both treatments have produced balanced, natural growth.

**Clinical Applications & Systemic Hierarchy**

The statistical validation of the **Samanya Vishesha Siddhanta** in this longitudinal model supports a clear clinical hierarchy for treating tissue depletion (*Dhatu Kshaya*):

**Chart 3 : Clinical Applications & Systemic Hierarchy**




1. **Dravya Samanya (First-Line Therapy):** It should be the first choice in advanced or acute tissue wasting or when there is an urgent need to restore the structural mass. Homologous animal tissues provide the most efficient and direct route for replenishment, as they require fewer metabolic steps to assimilate.

2. **Guna Samanya (Second-Line Therapy):** It is the best alternative when direct homologous alternatives are not available, not suitable to the digestive capacity of the patient (Agni) or limited by the dietary habits. It can also be chosen when the concentrated replenishment of only some tissue characteristics is required.

3. **Karma Samanya (Supportive Therapy):** Along with the dietary interventions, actions on the physical plane or therapies with qualities similar to the desired result (e.g. resistance or specific rest) have to be used to guide and optimise the tissue development.

## Conclusion

This study builds a bridge between the ancient Ayurvedic pharmacological laws and the modern biomedical standards by providing a robust validation of Samanya Vishesha Siddhanta in a longitudinal manner using a Drosophila melanogaster model. The longitudinal morphometric studies clearly reveal that both the therapeutic modalities are effective for the reversal of tissue depletion (Dhatu Kshaya) but statistically Dravya Samanya is found to be superior to Guna Samanya. Administration of AjaMamsa (goat meat) showed 24.75% increase in body mass as compared to 19.00% increase by Masha (black gram) which was highly significant.

The result is closely related to the biochemical and energetic classifications of the substances. AjaMamsa is an animal tissue and hence a direct and homologous structural match requiring fewer metabolic steps for assimilation, while Masha is plant-derived and requires extensive metabolic conversion to match animal protein structures. Also, the uniformity of BMI trends in cohorts validated that consequent weight gain was an expression of true balanced structural density (Mamsa Vardhana) and not a pathological fat storage.

The empirical results ultimately define a clear clinical systemic hierarchy of nutritional therapeutics. Drawya Samanya is validated as a first-line intervention and biologically aligned to immediately target severe or acute structural wasting.

## Declarations & Administrative Framework


- **Funding Statement:** This research received no specific grant or financial support from any funding agencies in the public, commercial, or not-for-profit sectors.
- **Conflicts of Interest:** The authors declare that there are no competing financial or personal conflicts of interest that could influence the integrity or reporting of this study.
- **Data Availability:** The complete morphometric datasets, statistical variance tables, and high-resolution stereomicroscopy records generated during this 30-day trial are available from the corresponding author upon reasonable academic request.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