INFORMATICS JOURNALS

Research Article

Journal of Natural Remedies
DOI: 10.18311/jnr/2026/55779

eISSN: 2320-3358 | Vol 26(10), 2026 | pp. 2777-2784

# Development and Clinical Evaluation of a Novel *Ghrita* Formulation for Management of Autism Spectrum Disorder

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## Abstract

**Background:** Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder requiring integrative management approaches. *Ayurvedic* formulations such as *Durvabrahmi Ghrita* are *Anubhuta Ayurvedic* formulations composed of *Cynodon dactylon* (*Durva*), *Bacopa monnieri* (*Brahmi*), cow milk (*Go-dugdha*), and cow ghee (*Go-ghrita*), traditionally used for neuropsychiatric conditions and possessing cognitive-enhancing properties. **Aim:** The present study aimed to develop, standardise, and clinically evaluate *Durvabrahmi Ghrita* for the management of ASD. **Methods:** The formulation was prepared using the classical *Sneha Kalpana* method and evaluated by organoleptic, phytochemical, nutritional and HPTLC fingerprinting. A comparative clinical study was conducted on 40 ASD patients divided into two groups. Group A received oral *Durvabrahmi Ghrita* with *Nasya* (Nasal administration) and *Shiropichu* in addition to behaviour treatment, while Group B received only behaviour therapy. Statistical analysis was performed using paired and unpaired t-tests. **Results:** Physico-chemical parameters confirmed the formulation's stability and quality, and HPTLC profiling revealed multiple bioactive phytoconstituents. Nutritional analysis showed the presence of 87.24% fat,4.06 % protein and 34.01% carbohydrates, indicating enrichment compared to plain ghee. Clinically, Group A showed statistically significant improvement ($p<0.05$) in cognitive, sensory, and behavioural parameters compared to Group B. **Conclusion:** *Durvabrahmi Ghrita* is a standardised, nutritionally enriched formulation with significant potential as an adjunct therapy in ASD management.

**Major Findings:** The formulation demonstrated enhanced nutritional composition, confirmed phytoconstituents and significant clinical efficacy over behavioural therapy alone in improving cognitive and behavioural outcomes in ASD.

**Keywords:** Autism Spectrum Disorder, *Durvabrahmi Ghrita*, HPTLC, *Medhya Rasayana, Sneha Kalpana*

(Article Chronicle: Article Received on: 10.04.2026; Revised on: 11.08.2026; Accepted on: 27.08.2026)

## 1. Introduction

*Durvabrahmi Ghrita* is one of the *Ayurvedic* formulations. This preparation contains *Durva, Brahmi, Go-dugdha,* and *Go-ghrita* as *Sneha Dravya*. Being a *Medhya* drug, *Brahmi* is advised for several psychiatric and psychosomatic conditions. *Ghee* is the foundation for the majority of formulations that affect the psyche. It's common knowledge that medications must cross the blood-brain barrier to reach the brain, and ghee is the ideal drug-delivery system for this[1]. The Lord Ganesha, a god who clears the path of his devotees, is worshipped with the *Durva* grass (*Cynodon dacylon* (L.) Pers), an auspicious plant[2]. It exhibits a variety of pharmacological properties, including antidiabetic properties, antioxidant, hepatoprotective, antiulcer, immunomodulatory, central nervous system depressant, antimicrobial, and anticancer[3]. In *Ayurveda*, *Atyartava* (hypermetrogia), *Jalodar* (ascites), *Vaman* (bilious vomiting), *Garbhapat* (abortion),

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*Apasmara* (epilepsy), and *Unmad* (psychosis) are all treated with the fresh juice of *Durva*[4]. An important medicinal herb in Indian *Ayurvedic* medicine is *Brahmi* (*Bacopa monnieri* L.). *Brahmi* is a type of perennial herbaceous plant that is part of the Scrophulariaceae family. It is a nootropic *Ayurvedic* plant that has been used for a long time to treat neurological conditions[5]. Bacosides, the active components of *Brahmi*, enhance memory and cognition by enhancing nerve impulse transmission efficiency and improving memory and related problems[6]. *Ghrita's* lipophilic properties facilitate its entry into cells and enable it to reach the nuclear membrane, mitochondrion, and microsome. The activity and usefulness of herbs are greatly increased when they are treated with ghrita. That is, medications administered in the form of ghee, a type of fat, are quickly absorbed and distributed throughout the targeted bodily regions, in this case, the nervous system[7]. *Durvabrahmi Ghrita* was made by the *Sneha Kalpana* Method. Its organoleptic, physicochemical, and HPTLC tests were done. Due to its active ingredients like bacopaside, flavonoids, and terpenoids, it works as an anti-inflammatory and neuroprotective agent.

## 2. Materials and Methods

### 2.1 Materials

Fresh drugs like *Durva* and *Brahmi* were purchased from Vishwabhaishaj Farm, Sambhaji Nagar, Maharashtra. *Go-ghrita* and *Go-dugdha* from the Amul company were procured from a local shop in Vadodara, Gujarat. Raw drugs were identified and authenticated by the Department of Dravyaguna, Parul Institute of Ayurved, Parul University, Vadodara, Gujarat.

### 2.2 Formulation Preparation

*Durvabrahmi Ghrita* was prepared at Parul Ayurved Pharmacy, Parul Institute of Ayurved, Parul University, Vadodara. After obtaining all the ingredients (Quantity given in Table 1) for *Ghrita*, the first step was to extract *Brahmi Swarasa* and *Durva Swarasa*. This was done by applying mechanical pressure to fresh *Brahmi* and *Durva*, exerting pressure through mechanical means. In a large vessel, *Go-Ghrita* was poured, which liquefies under a moderate flame, followed by the addition of *Brahmi, Durva Swarasa, and Gokshira.* To get the final product, the contents were subjected to heat till up to *Sneha Siddhi Lakshanas* were observed. The *Durvabrahmi Ghrita* was filtered using muslin cloth. Then, the developed formulation was stored in dry, air-tight containers.

### 2.3 Evaluation of Formulation

#### 2.3.1 Organoleptic Characters

Organoleptic characteristics of the final products, including colour, texture, odour, touch, and taste, were observed with the help of the sense organs and recorded.

#### 2.3.2 Physicochemical Parameters

Acid value, saponification value, refractive index, and specific gravity were among the conventional physicochemical criteria used to analyse *Durvabrahmi Ghrita*. Using a methanolic extract of *Ghrita* and a suitable solvent solution, High-Performance Thin-Layer Chromatography (HPTLC) was also performed.

#### 2.3.3 HPTLC Fingerprint Profiling

For HPTLC analysis, 0.1 mL of the sample was diluted with 1 mL hexane, mixed well, and used as the test solution. Chromatography was performed using a CAMAG Linomat 5 applicator on MERCK silica gel 60 F254 aluminium plates, with 5 µL sample applied at 10 mm from the base and developed up to 80 mm. The mobile phase consisted of n-hexane: diethyl ether (7:3 v/v) in a CAMAG twin trough chamber saturated for 30 min.

**Table 1.** Ingredients used in the preparation of *Durvabrahmi Ghrita*

| Sr. No. | Sanskrit Name | Scientific Name | Part Used | Form | Part |
|---|---|---|---|---|---|
| 1 | *Durva* | *Cynodon dactylon* | Whole Plant | *Swarasa* | 20 Liters |
| 2 | *Brahmi* | *Bacopa monnieri* | Whole Plant | *Swarasa* | 20 Liters |
| 3 | *Goghrita* | - | - | - | 10 Liters |
| 4 | *Godugdha* | Cow milk | - | - | 5 Liters |

Pre-chromatographic derivatisation was done using 5% alcoholic KOH, followed by heating at 100 ± 5°C for 10 min. The plate was visualised at 254 nm, 366 nm, and 540 nm after derivatisation. Final derivatisation was carried out by dipping the plate in 5% sulphuric acid in methanol, followed by heating at 100 ± 5°C for 3 min, and Rf values were recorded.

#### 2.3.4 Nutritional Values

Standard analytical techniques were used to ascertain the sample's approximate nutritional composition. The Kjeldahl method was used to estimate total protein, which was represented as nitrogen × 6.25. Soxhlet extraction utilising petroleum ether as the solvent was used to calculate total fat. The enzymatic-gravimetric approach was used to measure total dietary fibre, and the difference method was used to determine total carbohydrate content. Water conversion parameters (4 kcal/g for protein and carbohydrate and 9 kcal/g for fat) were used to determine the sample's total calorific value. High-Performance Liquid Chromatography (HPLC) was used to measure the amount of vitamin A, and standard retinol was used for calibration[8-12].

### 2.4 Clinical Study

The protocol study was approved by the Institute Ethical Committee of Parul Institute of Ayurved, and approval no. PU/PIA/IEC/11/2025/439.In this comparative clinical study, 40 children with autism spectrum disorder (ASD) were included in the sample. Two groups of participants were formed: Group B (n = 20) received non-pharmacological therapy, and Group A (n = 20) received specific *Ayurvedic* therapeutic techniques. Standardised tests such as DSM-5TM (299.00), CARSTM-2, ISAA, and ATEC were used for the diagnostic examination. Assessments were conducted at three intervals during the three-month treatment period: Day 1 (Baseline), Day 90 (Pretreatment), and Day 180 (Posttreatment). Unpaired t-tests were used to assess differences between the two groups, while paired t-tests were used to analyse within-group changes.

## 3. Results and Discussion

*Shiropichu* with *Durvabrahmi Ghrita* may help control symptoms of Autism by reducing neuroinflammation, relaxing the nervous system, and modifying brain function via transcranial absorption. In *Ayurveda*, *Shiropichu* is a type of *Murdhni Taila* therapy in which a cotton pad is used to hold therapeutic oil or ghee on the scalp[13]. Using this technique, lipophilic substances from *Brahmi* and *Durva,* such as bacosides, flavonoids, sterols, and terpenoids, can pass through scalp capillaries and directly reach the central nervous system. The ghee base facilitates the absorption of these chemicals and serves as a carrier for their bioactivity. While flavonoids like luteolin and apigenin from both herbs have anti-inflammatory and neuroprotective properties, bacoside A3 and jujubogenin from *Brahmi* promote neural plasticity and lower oxidative stress. Terpenoids and sterols found in *Durva* also support membrane stability and mood control, which may lessen behavioural symptoms associated with autism. *Brahmi* has a neuroprotective effect[14], enhances cognition and memory function, is an antioxidant, supports neuronal communication, promotes neurogenesis (synaptogenesis) enhanced Brain-Derived Neurotrophic Factor (BDNF) levels.

### 3.1 Evaluation of Formulation

#### 3.1.1 Organoleptic Characteristics

The developed formulation showed a light green colour with a characteristic ghee-like odour and *tikta* (bitter) taste. So, these organoleptic properties are consistent with the herbal constituents and lipid base used in the formulation and serve as a preliminary indicator of the formulation's identity and quality. Results are noted in Table 2.

#### 3.1.2 Physicochemical Evaluation

The physicochemical characteristics of the developed formulation are reported in Table 3 that indicate quality and stability. The loss on drying at 105°C was found to be 1.35 %w/w, showing minimum presence of moisture in the formulation. The total ash value was 0.28%w/w, suggesting a low level of inorganic impurities.

**Table 2.** Organoleptic characteristics of the developed *Durvabrahmi Ghrita*

| Characteristics | ***Durvabrahmi Ghrita*** |
|---|---|
| Colour | Light Green |
| Odour | Characteristic smell of Ghee |
| Consistency | Liquid |
| Taste | *Tikta* |

The acid value of the formulation was 3.029%w/w indicating a low level of free fatty acids and good stability of the lipid base. The Refractive index was noted to be 1.4620, which is within the acceptable range of *ghrita*-based formulation and reflects the purity and consistency of the lipid medium.

The pH of the formulation was found to be 4.7, that slightly acidic. The specific gravity was 0.894, which is characteristic of lipid-based preparations. The saponification value was 241, indicating the presence of fatty acid esters typical of *ghrita*-based preparations. The rancidity test was found to be negative that indicate that formulation has not undergone oxidative deterioration and remains chemically stable.

### 3.1.3 HPTLC Fingerprint Profiling

The HPTLC analysis of the developed formulation showed characteristic chromatographic fingerprints under different detection conditions (Figure 1 and Table 4). At 254 nm, three spots were observed with $R_f$ values 0.15,0.65 and 0.78. After derivatization, six spots appeared at 366 nm and 540nm with $R_f$ values 0.11,0.15,0.39.0.49,0.69 and 0.81, indicating the presence of multiple phytoconstituents. The observed $R_f$ values may correspond to bioactive compounds such as triterpenoids, saponins, flavonoids, sterols, fatty acids and phenolic compounds present in *Brahmi* (*Bacopa monnieri*) and *Durva* (*Cynodon dactylon*). These constituents, including bacosides, beta-sitosterol, stigmasterol and fatty acid derivatives, are known for their antioxidant, anti-inflammatory and neuroprotective activities, indicating successful incorporation of herbal components into the *ghrita* formulation.

**Table 3.** Physicochemical characteristics of the developed *Durvabrahmi Ghrita*

| | ***Durvabrahmi Ghrita*** |
|---|---|
| **Parameters** | **Value** |
| Loss of Drying at 105°C (%w/w) | 1.35 |
| Total Ash Value (%w/w) | 0.28 |
| Acid Value | 3.0294 %w/w |
| Refractive Index | 1.4620 |
| pH Value | 4.7 |
| Rancidity | Not Rancid |
| Specific Gravity | 0.894 %w/w |
| Saponification Value | 241 |

### 3.1.4 Nutritional Profile

The nutritional analysis reported in Table 5 indicates that the finished formulation contained 87.24% fat along with 4.06% protein and 34.01% carbohydrates, whereas pure cow ghee contained almost 99.7% fat. The presence of additional nutrients in the finished preparation indicates the transfer of phytoconstituents from plants during the *ghrita* preparation process. The caloric values and vitamin A present in the formulation contribute to the nutritional and therapeutic values of the formulation.

## 3.2 Clinical Study of Formulation

A clinical study on the effectiveness of *Ayurvedic* treatment modalities (Group A) compared to non-pharmacological therapies (Group B) for autism spectrum disorder (ASD).

In Group A, patients were treated with *Durvabrahmi Ghrita* orally, as a *Nasya* (Nasal administration), and with *Shiropichu* with *Durvabrahmi Ghrita* and behaviour therapy. In Group B, patients received only behaviour therapy.

### 3.2.1 Effect of Selected Ayurvedic Treatment Modalities (Group A)

In this group, 20 patients aged between 5 and 12 years completed the full treatment course. Results were calculated using a paired t-test and noted in Tables 6 to 8.

### 3.2.2 Effect of Non-Pharmacological Therapies (Group B)

This group also consisted of 20 patients aged 5 to 12 years treated for 180 days. Results are noted in Table 9-10.

**Table 4.** HPTLC fingerprint profile showing $R_f$ values of *Durvabrahmi Ghrita*

| Sample | Detection Condition | No. of spots | $R_f$ values |
|---|---|---|---|
| *Durvabrahmi Ghrita* | @ 254nm | 3 | 0.15, 0.65, 0.78 |
| | @366nm (after derivatization) | 6 | 0.11,0.15,0.39,0.49,0.69,0.81 |
| | @540nm (after derivatization) | 6 | 0.11,0.15,0.39,0.49,0.69,0.81 |

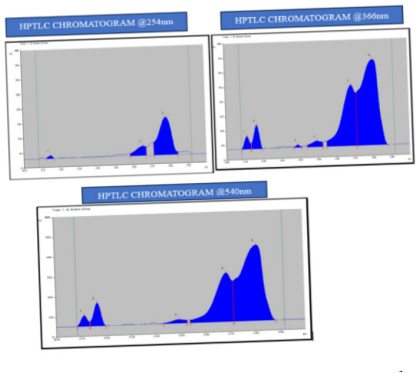



**Figure 1.** HPTLC chromatograms of *Durvabrahmi Ghrita* under different detection conditions.

**Table 5.** Nutritional composition of *Durvabrahmi Ghrita* compared with pure cow ghee

| Parameters | Finished Product *Durvabrahmi Ghrita* | Pure Cow Ghee used in Ghee Preparation |
|---|---|---|
| Total Protein (%) | 4.06 % | 0 |
| Total Fat (%) | 87.24 % | 99.7 |
| Total Carbohydrate (%) | 34.01 % | 0 |
| Total Fibre (%) | 0.00 % | 0 |
| Total Calorie | 248.4 K Cal | 897 Kcal |
| Vit A | 400 mcg | 600 mcg |

**Table 6.** Effect of *Ayurvedic* treatment modalities (Group A) on core objective criteria

| Sr. No. | Criteria | Day 1 Mean | Day 90 Mean | Day 180 Mean | Result (Day 90-180) |
|---|---|---|---|---|---|
| 1 | Social Relationship and reciprocity | 29.75 | 29.00 | 26.90 | Significant (p=0.002) |
| 2 | Emotional Responsiveness | 13.30 | 12.95 | 11.60 | Significant (p=0.006) |
| 3 | Speech-Language and Communication | 21.65 | 21.30 | 19.25 | Significant (p=0.001) |
| 4 | Behaviour Patterns | 19.55 | 17.90 | 14.90 | Significant (p=0.001) |
| 5 | Sensory Aspects | 12.10 | 12.10 | 11.15 | Significant (p=0.012) |
| 6 | Cognitive Component | 8.65 | 8.55 | 7.85 | Significant (p=0.04) |
| 7 | Total Score ISSA | 104.75 | 101.95 | 91.45 | Significant (p=0.001) |

**Table 7.** Effect of *Ayurvedic* treatment modalities (Group A) on behavioural and sensory subscales

| Sr. No. | Criteria | Day 1 Mean | Day 90 Mean | Day 180 Mean | Result (Day 90-180) |
|---|---|---|---|---|---|
| 1 | Relation to people/Social-Emotional | 2.65 | 2.65 | 2.62 | Insignificant (p=0.32) |
| 2 | Imitation/Emotional Expression | 2.62 | 2.62 | 2.57 | Insignificant (p=0.16) |
| 3 | Emotional Response/Relation to people | 2.75 | 2.75 | 2.47 | Significant (p=0.001) |
| 4 | Body Use | 2.80 | 2.70 | 2.45 | Significant (p=0.001) |
| 5 | Object Use | 2.75 | 2.67 | 2.47 | Significant (p=0.002) |
| 6 | Adaptation to change/Restricted Interest | 2.72 | 2.72 | 2.55 | Significant (p=0.004) |
| 7 | Visual Response | 2.75 | 2.67 | 2.50 | Significant (p=0.004) |
| 8 | Listening Response | 2.70 | 2.60 | 2.40 | Significant (p=0.002) |
| 9 | Taste, Smell and Touch Response | 2.55 | 2.52 | 2.30 | Significant (p=0.008) |
| 10 | Fear or Nervousness/Anxiety | 2.65 | 2.65 | 2.57 | Insignificant (p=0.18) |
| 11 | Verbal Communication | 2.75 | 2.75 | 2.57 | Significant (p=0.004) |
| 12 | Nonverbal Communication | 2.65 | 2.57 | 2.50 | Insignificant (p=0.08) |
| 13 | Activity Level/Cognitive Integration | 2.67 | 2.65 | 2.22 | Significant (p=0.001) |
| 14 | Consistency of Intellectual Response | 2.62 | 2.55 | 2.32 | Significant (p=0.001) |
| 15 | General Impression | 2.70 | 2.67 | 2.52 | Insignificant (p=0.055) |

**Table 8.** Effect of *Ayurvedic* treatment modalities (Group A) on assessment scale scores

| Sr. No. | Scale | Day 1 Mean | Day 90 Mean | Day 180 Mean | Result (Day 90-180) |
|---|---|---|---|---|---|
| 1 | Total Score CARS | 40.30 | 39.75 | 37.07 | Significant (p=0.001) |
| 2 | Speech/Language (ATEC) | 21.00 | 20.55 | 19.60 | Significant (p=0.002) |
| 3 | Sociability (ATEC) | 28.00 | 27.45 | 23.90 | Significant (p=0.001) |
| 4 | Sensory/Cognitive Awareness (ATEC) | 22.15 | 22.00 | 20.45 | Significant (p=0.01) |
| 5 | Health/Physical Behaviour (ATEC) | 41.65 | 38.45 | 26.95 | Significant (p=0.001) |
| 6 | Total Score ATEC | 112.50 | 108.15 | 90.90 | Significant (p=0.001) |

**Table 9.** Effect of non-pharmacological therapy (Group B) on core objective criteria

| Sr. No. | Criteria | Day 1 Mean | Day 90 Mean | Day 180 Mean | Result (Day 90-180) |
|---|---|---|---|---|---|
| 1 | Social Relationship and reciprocity | 24.25 | 24.40 | 22.95 | Significant (p=0.001) |
| 2 | Emotional Responsiveness | 12.85 | 12.70 | 11.85 | Significant (p=0.001) |
| 3 | Speech-Language and Communication | 22.55 | 22.20 | 21.15 | Significant (p=0.001) |
| 4 | Behavior Patterns | 19.55 | 18.55 | 16.40 | Significant (p=0.001) |
| 5 | Sensory Aspects | 10.45 | 10.20 | 9.80 | Significant (p=0.007) |
| 6 | Cognitive Component | 8.20 | 8.20 | 8.20 | No Effect (p=N/A) |
| 7 | Total Score ISSA | 98.20 | 96.30 | 90.00 | Significant (p=0.001) |

**Table 10.** Effect of non-pharmacological therapy (Group B) on behavioural and sensory sub-scales

| Sr. No. | Criteria | Day 1 Mean | Day 90 Mean | Day 180 Mean | Result (Day 90-180) |
|---|---|---|---|---|---|
| 1 | Relation to people/Social-Emotional | 2.40 | 2.40 | 2.40 | No Effect (p=N/A) |
| 2 | Imitation/Emotional Expression | 2.42 | 2.37 | 2.40 | Insignificant (p=0.32) |
| 3 | Emotional Response/Relation to people | 2.62 | 2.57 | 2.45 | Insignificant (p=0.056) |
| 4 | Body Use | 2.67 | 2.60 | 2.40 | Significant (p=0.007) |
| 5 | Object Use | 2.50 | 2.45 | 2.25 | Significant (p=0.016) |
| 6 | Adaptation to change/Restricted Interest | 2.62 | 2.57 | 2.45 | Insignificant (p=0.056) |
| 7 | Visual Response | 2.42 | 2.35 | 2.17 | Significant (p=0.015) |
| 8 | Listening Response | 2.47 | 2.47 | 2.32 | Significant (p=0.01) |
| 9 | Taste, Smell and Touch Response | 2.25 | 2.17 | 2.07 | Significant (p=0.042) |
| 10 | Fear or Nervousness/Anxiety | 2.45 | 2.45 | 2.20 | Significant (p=0.004) |
| 11 | Verbal Communication | 2.90 | 2.87 | 2.57 | Significant (p=0.002) |
| 12 | Nonverbal Communication | 2.67 | 2.65 | 2.40 | Significant (p=0.001) |
| 13 | Activity Level/Cognitive Integration | 2.77 | 2.67 | 2.35 | Significant (p=0.001) |
| 14 | Consistency of Intellectual Response | 2.37 | 2.35 | 2.22 | Insignificant (p=0.056) |
| 15 | General Impression | 2.62 | 2.62 | 2.57 | Insignificant (p=0.16) |

### *3.2.3 Comparative Statistical Analysis (Group A vs. Group B)*

Comparative significance was determined using an unpaired t-test of the mean difference scores. Results are noted in Table 11.

In Group A (*Ayurvedic* treatment modalities), significant improvement was observed in core objective criteria, including social relationship, emotional responsiveness, speech-language communication, behaviour patterns, sensory aspects and cognitive

**Table 11.** Comparative statistical analysis between Group A and Group B

| Sr. No. | Criteria | Group A Mean Diff | Group B Mean Diff | Comparative Result |
|---|---|---|---|---|
| 1 | Social Relationship and Reciprocity | 2.10 | 1.45 | Insignificant (p=0.218) |
| 2 | Emotional Responsiveness | 1.35 | 0.85 | Insignificant (p=0.32) |
| 3 | Speech-Language and Communication | 2.05 | 1.05 | Significant (A > B) (p=0.033) |
| 4 | Behavioural Patterns | 3.00 | 2.15 | Insignificant (p=0.19) |
| 5 | Sensory Aspects | 0.95 | 0.40 | Insignificant (p=0.14) |
| 6 | Cognitive Component | 0.70 | 0.00 | Significant (A > B) (p=0.01) |
| 7 | Total Score ISSA | 10.50 | 6.30 | Significant (A > B) (p=0.01) |
| 8 | Emotional Response/Relation to People | 0.27 | 0.12 | Insignificant (p=0.08) |
| 9 | Body Use | 0.25 | 0.20 | Insignificant (p=0.60) |
| 10 | Object Use | 0.20 | 0.20 | Insignificant (p=0.99) |
| 11 | Adaptation to Change/Restricted Interest | 0.17 | 0.12 | Insignificant (p=0.54) |
| 12 | Visual Response | 0.17 | 0.17 | Insignificant (p=0.99) |
| 13 | Listening Response | 0.20 | 0.15 | Insignificant (p=0.51) |
| 14 | Taste, Smell and Touch Response | 0.22 | 0.10 | Insignificant (p=0.17) |

component after 180 days ($p<0.05$). The total ISSA score decreased from 104.5 to 91.45, indicating overall clinical improvement. Significant improvements were also noted in several behavioural and sensory subscales as well as CARS and ATEC scores, reflecting better communication, sociability, sensory awareness and physical behaviour.

In Group B (non-pharmacological therapies), significant improvements were observed in most core parameters; however, no change was noted in the cognitive component.

Comparative analysis revealed that Group A showed greater improvement than Group B in speech-language communication, cognitive component and total ISSA score ($p < 0.05$). These findings suggest that *Ayurvedic* treatment modalities may provide additional benefits in improving communication and cognitive function in children with autism spectrum disorder.

## 4. Conclusion

According to pharmacognostical and physicochemical characteristics, the current study demonstrates that *Durvabrahmi Ghrita* meets the maximum quality and purity standards of the drug, thereby justifying the formulation's quality. The results of the chromatographic investigation indicate that the lipid formulation contains an active herbal medication. This study may serve as a reference standard for future quality control research projects and clinical investigations based on observations and experimental findings. In a clinical study, *Durvabrahmi Ghrita* was used in various treatment modalities in ASD patients. Autism Spectrum Disorder is a multidimensional neurodevelopmental condition requiring a holistic and multidisciplinary management approach. The present study provides preliminary evidence supporting the role of selected *Ayurvedic* therapies as a beneficial adjunct in ASD management.

## 5. Acknowledgments

The authors would like to thank Parul Ayurved Pharmacy for the preparation of the *Ghrita* formulation and Parul Institute of Ayurved and Vasu Research Centre for their support in quality testing and analytical study.

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## Author Contribution

Conceptualisation, S.R. and J.P.; methodology, S.R., J.P. and R.P.; formal analysis, S.R., J.P. and R.P.; data curation, S.R., J.P. and R.P.; writing – original draft preparation, R.P.; writing – review and editing, J.P., S.R. and R.P.; visualisation, J.P.; supervision, S.R. and J.P. All authors have read and agreed to the published version of the manuscript.