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PUDINA CHUTNEY AS A TRADITIONAL FUNCTIONAL FOOD: A SYSTEMATIC REVIEW OF ITS PHYTOCHEMISTRY, NUTRITIONAL PROFILE AND THERAPEUTIC POTENTIAL

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Abstract:

Pudina, or mint, chutney is one of the most familiar condiments in South Asian kitchens, made by grinding fresh mint (Mentha spicata) and coriander (Coriandrum sativum) leaves together with sesame seeds (Sesamum indicum), tamarind (Tamarindus indica) pulp, jaggery, and lemon (Citrus limon) juice. It is eaten in small spoonfuls rather than as a staple food, yet this six-ingredient blend packs in an unusually wide range of bioactive compounds—essential oils, flavonoids, phenolic acids, lignans, unsaturated fatty acids, organic acids, and micronutrients—each of which has its own substantial body of nutritional and pharmacological research behind it. This review synthesizes the published literature on the nutrition, phytochemistry, and health-related properties of each of the six ingredients, and uses that evidence to build a picture of pudina chutney as a functional food. The sources drawn on span recent reviews from 2018–2026 covering sesame nutrition and lignans, spearmint and coriander phytochemistry, tamarind's nutraceutical value, jaggery's mineral and phenolic content, and lemon's vitamin C and flavonoid chemistry, alongside the broader food-science literature on Indian chutneys as traditional functional foods. Overall, the review suggests that pudina chutney, when made with attention to ingredient ratios and minimal cooking, can genuinely add antioxidant, anti-inflammatory, digestive, antimicrobial, and micronutrient value to the everyday diet while flagging a few things worth keeping in mind, including its sodium/sugar load, oxalate content, and the allergen potential of sesame.

Keywords: *Pudina Chutney, Mint, Coriander, Sesame, Tamarind, Jaggery, Lemon, Functional Food, Phytochemistry, Antioxidant Activity.*

1. Introduction

Chutneys hold a distinctive place in South Asian food culture: they are eaten in small quantities alongside a staple dish, yet they carry a disproportionately high concentration of bioactive plant compounds. Traditional Indian food

adjuncts—pickles, wet and dry chutneys, and similar preparations—are increasingly recognized in the food-science literature as functional foods, meaning foods that provide a demonstrable health benefit beyond basic nutrition (1, 2). Ingredients typical of these adjuncts, including curry leaves, coriander leaves, mint leaves, and sesame seeds, are noted to be rich sources of proteins, vitamins, minerals, and phytochemicals despite the small servings in which they are consumed (1).

Pudina (mint) chutney is among the most common of these preparations. It is typically made by grinding fresh mint and coriander leaves with a souring agent (tamarind or lemon), a sweetening agent (jaggery), and an oilseed base (sesame or peanut) that gives the paste body and healthy fats. The version reviewed here—mint, coriander, sesame seeds, tamarind, jaggery, and lemon—is a particularly nutrient-dense variant: it combines a leafy-herb pair rich in essential oils and flavonoids, an oilseed rich in lignans and unsaturated fat, an organic-acid-rich fruit pulp, a mineral-retaining unrefined sweetener, and a vitamin-C-rich citrus juice, all in a single paste.

The aim of this review is to bring together the current scientific literature on the nutritional composition and health-relevant bioactivity of each of these six ingredients, and to use that evidence to build a picture of the likely nutritional and functional profile of the finished chutney. Because no clinical study has looked at this exact six-ingredient combination, the review takes an ingredient-level approach—drawing on recent comprehensive reviews and primary studies for each component—and situates the findings within the broader framework of Indian traditional food adjuncts as functional foods (1).

2. Review methodology

This is a narrative synthesis rather than a systematic review, which reflects the simple fact that there is not yet a dedicated clinical literature on the composite chutney itself. Sources were drawn from peer-reviewed journals (*Nutrients*, *Journal of Food Biochemistry*, *Phytochemistry Reviews*, *eFood*, *Frontiers in Pharmacology*, *Food Chemistry*, and related titles) along with review articles indexed in PubMed, Scopus, and Google Scholar, and Indian food-science literature on traditional food adjuncts. For each ingredient, preference was given to recent (2018–2026) comprehensive or systematic reviews summarizing nutritional composition, phytochemical profile, and clinical or preclinical health outcomes. These ingredient-specific findings were then integrated at the level of the finished condiment, using standard nutrient-composition data to estimate a composite profile.

3. Ingredient-wise nutritional and phytochemical profile

3.1 Sesame seeds (*Sesamum indicum*)

Sesame seeds are among the oldest oilseed crops cultivated by humans, and they are valued nutritionally for their protein, unsaturated fatty acid, vitamin, and mineral content. Comprehensive reviews describe sesame as rich in lignan-type bioactives—chiefly sesamin, sesamol, and sesamolin—along with vitamin E (tocopherols and tocotrienols), calcium, magnesium, phosphorus, iron, copper, and zinc (3, 4). *In vitro*, *in vivo*, and clinical work links sesame to antioxidant, cholesterol-lowering, blood-lipid-regulating, hepatoprotective, renoprotective, cardioprotective, and anti-inflammatory effects (4). The mineral content in particular supports bone health: calcium, magnesium, and phosphorus assist bone development and help offset age-related bone loss, while sesame lignans have been associated with improved fracture healing in osteoporotic models (3).

Regular consumption of substantial—not merely garnish-level—portions of sesame seeds has been linked to better blood sugar regulation, reduced arthritic knee pain, and lower cholesterol and triglycerides, with the magnesium content additionally implicated in blood-pressure regulation (5). Soaking, roasting, or sprouting

sesame before use—something that happens naturally during the grinding and roasting steps common to chutney preparation—reduces antinutrients such as phytates and oxalates and improves nutrient bioavailability (3).

3.2 Mint / pudina (*Mentha spicata*)

Mint species, and spearmint (*Mentha spicata*) in particular, belong to the Lamiaceae family and are known for their high content of phenolic acids and flavonoids—notably kaempferol and quercetin derivatives—which underlie much of their antioxidant capacity (6, 7). Reviews of *Mentha* bioactivity report antimicrobial, anti-inflammatory, anticancer, antidiabetic, and cardioprotective effects, alongside a long tradition of use for digestive complaints such as indigestion, flatulence, and diarrhoea. Iranian traditional medicine, in particular, has long used spearmint leaves for gastrointestinal disorders, abdominal pain, colds, and headache (8).

Mint essential oil constituents interact with cellular signalling pathways implicated in inflammation and, in laboratory studies, cancer-cell proliferation, though most of this evidence is still preclinical (7). Nutritionally, fresh mint leaves contribute vitamin A, vitamin C, iron, and manganese in amounts that are modest but meaningful given how little mint is used per serving, and their essential-oil content—mostly carvone-type monoterpenes in spearmint—is responsible both for the characteristic cooling flavour and for antimicrobial activity that helps fresh chutney keep a little longer (9).

3.3 Coriander (*Coriandrum sativum*)

Coriander leaves (cilantro) are reported to be around 88% moisture, with meaningful contributions of carbohydrate, protein, crude fibre, calcium, phosphorus, iron, and notably high vitamin C, alongside B-complex vitamins (10). Phytochemical reviews identify flavonoids, terpenoids, and essential oils—with linalool as a key aromatic constituent—as responsible for coriander's antioxidant, anti-inflammatory, antimicrobial, hypoglycaemic, hypolipidaemic, and neuroprotective activities (11, 12). Coriander has a long history of traditional use for gastrointestinal complaints, and current research also points to antidiabetic, antihypertensive, antiatherogenic, and cardioprotective actions, which positions it as a genuine functional-food ingredient rather than a purely aromatic garnish (13).

Because coriander typically forms the bulk of the leafy-green base of pudina chutney (alongside mint), it is a major contributor of vitamin C, provitamin-A carotenoids, and dietary fibre to the finished product, while its essential oils work alongside those of mint to boost the antimicrobial and preservative properties of the paste (12).

3.4 Tamarind (*Tamarindus indica*)

Tamarind pulp, the souring agent in this chutney, is rich in tartaric acid (rather than the citric acid that dominates in lemon), along with flavonoids, tannins, alkaloids, and saponins. Recent reviews of the phytochemical and physiological literature credit tamarind with free-radical scavenging activity, improved antioxidant and detoxification enzyme activity, antimicrobial effects, and beneficial actions on lipid profile, glycaemic control, and inflammatory markers, with some mechanistic work extending to diabetes-related complications (14).

Tamarind pulp also supplies dietary fibre, magnesium, potassium, and calcium, and its traditional use extends to digestive support: its fibre binds bile salts in the colon, which assists the excretion of LDL-associated cholesterol, while its mild laxative action supports regular bowel function (15). Within the chutney, tamarind's acidity also contributes a preservative effect and enhances the tartness that balances the sweetness of jaggery.

3.5 Jaggery

Jaggery—unrefined, non-centrifugal sugarcane concentrate, known in India as *gur*—differs from refined white sugar in that it retains the mineral and phenolic fraction of sugarcane juice through minimal processing. Published mineral analyses report substantial calcium, magnesium, potassium, phosphorus, sodium, and iron content per 100 g, together with small amounts of B-complex vitamins and vitamin C, and phenolic and flavonoid compounds including caffeic, chlorogenic, and coumaric acids and flavonoids such as naringenin and apigenin derivatives (16). Recent reviews credit jaggery with antioxidant, cytoprotective, anti-inflammatory, antibacterial, antidiabetic, and antiatherosclerotic effects relative to refined sugar, though, being still predominantly sucrose, it needs to be used in moderation, particularly by people managing blood glucose (16, 17).

In pudina chutney, jaggery is used in modest quantity to round out the sour and pungent notes from tamarind, lemon, and green chilli, rather than as a primary source of calories; therefore, its mineral contribution, particularly iron, magnesium, and potassium, matters more nutritionally than its sugar load does at typical serving sizes (17).

3.6 Lemon (*Citrus limon*)

Lemon juice is included mainly as an acidulant and flavour-brightening agent, but it is also the most concentrated source of vitamin C among the six ingredients—roughly 50 mg per 100 mL of juice—which is a meaningful contribution to daily intake even at the small volumes used in chutney (18). Beyond ascorbic acid, phytochemical reviews of lemon report flavonoids (hesperidin, eriocitrin, diosmin), limonoids (limonin), essential oils (limonene, citral), and phenolic acids (ferulic, *p*-coumaric), which together contribute antioxidant, cardiovascular, antimicrobial, and collagen-supportive effects (18).

Vitamin C also acts synergistically with the iron present in coriander, mint, and jaggery: ascorbic acid enhances the intestinal absorption of non-haem plant iron, so the lemon in this chutney can improve how well the body absorbs the iron contributed by the other ingredients—a favourable food-combining effect frequently noted in plant-based Indian diets (18).

4. Estimated composite nutritional profile of pudina chutney

Because pudina chutney is made in different proportions from household to household, the table below shows an indicative nutrient contribution per ingredient, drawn from published per-100 g / 100 mL composition data for each raw ingredient rather than from a single validated recipe analysis. This ingredient-level view makes it easier to see which component of the chutney is mainly responsible for each nutrient or bioactive class.

Read together, the composite chutney gets its protein and healthy-fat content almost entirely from sesame; its vitamin C from coriander, mint, and lemon in combination; its iron from coriander, mint, and jaggery, with lemon's vitamin C boosting that iron's absorption; and its major electrolytes—potassium, magnesium, calcium—from tamarind and jaggery. This complementary spread across ingredients is typical of composite Indian chutneys, and it is one of the reasons food scientists have started classifying such preparations as functional food adjuncts rather than simple flavourings (1).

Table 1 presents the indicative nutritional and bioactive contributions of individual raw ingredients commonly used in pudina chutney. It highlights key nutrients, phytochemicals, antioxidants, vitamins, minerals, and other beneficial compounds. These components collectively contribute to the chutney's nutritional value and potential functional properties, including antioxidant, digestive, antimicrobial, and health-promoting effects.

Table 1: Indicative nutritional and bioactive contribution of individual raw ingredients in pudina chutney

Ingredient	Principal macronutrient contribution	Key micronutrients	Principal bioactive compounds
Sesame seeds (*Sesamum indicum*)	Protein, unsaturated (mono & poly) fat, dietary fibre	Calcium, magnesium, phosphorus, iron, zinc, copper	Sesamin, sesamol, sesamolin, vitamin E (tocopherols)
Mint (*Mentha spicata*)	Negligible calories; trace fibre	Vitamin A, vitamin C, iron, manganese	Menthol/carvone-type monoterpenes, kaempferol & quercetin flavonoids
Coriander leaves (*Coriandrum sativum*)	Trace protein and fibre	Vitamin C, vitamin A precursors, calcium, iron	Linalool, phenolic acids, flavonoids
Tamarind pulp (*Tamarindus indica*)	Carbohydrate (natural sugars), dietary fibre	Magnesium, potassium, calcium	Tartaric acid, flavonoids, tannins, saponins
Jaggery	Carbohydrate (sucrose, invert sugars)	Iron, potassium, magnesium, phosphorus, calcium	Phenolic acids (caffeic, chlorogenic), flavonoids (naringenin, apigenin)
Lemon juice (*Citrus limon*)	Trace carbohydrate	Vitamin C (~50 mg/100 mL), potassium	Citric acid, hesperidin, eriocitrin, limonene

5. Synergistic health benefits of the composite chutney

5.1 Antioxidant and anti-inflammatory potential

All six ingredients show antioxidant activity in the literature individually, arising from distinct but overlapping compound classes: sesame lignans and vitamin E (3), mint and coriander flavonoids and essential oils (7, 11), tamarind tannins and flavonoids (14), jaggery phenolic acids (16), and lemon vitamin C and flavonoids (18). Combined in a single paste, this amounts to a multi-mechanism antioxidant system—lipid-soluble antioxidants such as vitamin E and essential oils working alongside water-soluble ones like vitamin C and phenolic acids—which, in principle, offers broader free-radical scavenging coverage than any single ingredient eaten on its own.

5.2 Digestive support

Several ingredients here have a long history of traditional, and increasingly evidence-based, use for digestive complaints. Mint and coriander are both traditionally used for indigestion, flatulence, and abdominal discomfort (8); tamarind's fibre and mild laxative action support bowel regularity (15); and lemon juice is commonly associated with stimulating digestive secretions (18). Eaten alongside starch-heavy staple foods, as chutneys typically are, this combination may support digestive comfort, though rigorous clinical trials of the finished condiment itself are still lacking.

5.3 Cardiometabolic considerations

Sesame lignans, tamarind flavonoids, jaggery phenolics, and lemon flavonoids have each separately been associated with favourable effects on lipid profile, blood pressure, or glycaemic control in preclinical or small clinical studies (3, 14, 16). Coriander in particular has documented insulin-releasing and insulin-like activity in traditional antidiabetic use (12). That said, jaggery and tamarind both contribute natural sugars, so the net glycaemic impact of the finished chutney depends heavily on the jaggery-to-acid ratio used in preparation. At the

small serving sizes typical of a condiment, this is unlikely to matter much for most people, but it is worth keeping in mind for anyone managing diabetes.

5.4 Antimicrobial and preservative properties

The essential oils of mint and coriander, together with the organic acids of tamarind and lemon, have documented antimicrobial activity against a range of bacteria and fungi (9). This matters practically for chutney as a food product: the acidic pH from tamarind and lemon, combined with the antimicrobial essential oils of the leafy herbs, plausibly explains the traditional practice of making fresh chutney for short-term refrigerated storage without added preservatives.

5.5 Micronutrient density relative to portion size

Because chutney is eaten in small quantities—typically one to two tablespoons per serving—its real nutritional contribution is best thought of in terms of micronutrient density rather than total calories. Gram for gram, the leafy components (mint, coriander) and the citrus component (lemon) are considerably more nutrient-dense in vitamins A and C than most staple foods, so even a modest serving of chutney can meaningfully add to daily vitamin C and provitamin-A intake, especially in diets where fresh fruit is limited.

6. Pudina chutney within the framework of traditional Indian functional foods

Indian food-science literature has increasingly framed traditional food adjuncts—pickles, wet and dry chutneys, and related preparations—as functional foods: items eaten in small portions alongside staple meals that still deliver meaningful concentrations of bioactive compounds (1, 2). Reviews of this category note that ingredients such as curry leaves, coriander leaves, mint leaves, and sesame seeds used in these adjuncts are rich in proteins, vitamins, minerals, and phytochemicals, and that the natural antimicrobials and antioxidants in these spices and condiments also help extend the shelf life of the accompanying staple food (1).

Product-development studies on related preparations—including curry-leaf chutney powder standardized as a protein-, calcium-, and iron-rich functional food adjunct (19), and instant chutney tablets developed from coriander, amla, and curry leaves for extended shelf stability—point to a broader research trend toward formalizing the nutritional value of chutney-type condiments and developing shelf-stable formats that keep their functional properties intact. Pudina chutney, made fresh from mint, coriander, sesame, tamarind, jaggery, and lemon, fits squarely into this category: a small-portion condiment whose ingredient list is chosen as much for nutritional and preservative function as for flavour.

7. Preparation and processing considerations

How much nutritional value you actually get from pudina chutney depends a lot on how it is prepared. Because the chutney is typically eaten raw—ground rather than cooked—heat-labile compounds such as vitamin C from coriander and lemon, and the volatile essential oils from mint and coriander, are largely preserved compared with cooked preparations, which is a real nutritional advantage of this format over cooked chutneys or pickles.

Light roasting of sesame seeds before grinding, a common preparation step, has been shown in the broader sesame literature to reduce antinutrients such as phytates and oxalates, improving the bioavailability of the seeds' calcium, iron, and zinc while also boosting flavour (3). On the other hand, letting ground chutney sit at room temperature for too long can lead to oxidative degradation of vitamin C and essential oils, so refrigerated storage and a short consumption window—typically two to three days—are advisable to hold onto the nutrient and antimicrobial profile described above.

The ratio of jaggery and tamarind to the leafy-herb base also determines the finished sugar and acid content of the chutney; versions weighted more heavily toward mint, coriander, and lemon (and lighter on jaggery) will have a lower glycaemic contribution while keeping the antioxidant and micronutrient benefits described in Section 5.

8. Discussion and limitations

The evidence gathered here is strong at the level of individual ingredients: sesame, mint, coriander, tamarind, jaggery, and lemon each have a substantial and growing body of nutritional and pharmacological literature behind them. What is missing is direct clinical or analytical research on the composite chutney itself: no study identified for this review has analysed the finished six-ingredient pudina chutney for its actual nutrient composition, bioactive compound retention after grinding, or clinical outcomes following regular consumption. The picture offered here is therefore an evidence-based inference built from ingredient-level data, not a validated analytical or clinical finding for the finished product.

A few caveats are worth noting. Sesame is a recognized food allergen, and commercially prepared chutneys containing it should be labelled accordingly. Oxalate content, present in modest amounts in both sesame and coriander, may be worth considering for anyone prone to oxalate kidney stones if the chutney is eaten in large quantities. And because chutney is a condiment eaten in small servings, none of the beneficial associations described in the ingredient-level literature should be read as clinically significant at typical serving sizes without direct study of the finished product—the value of this review lies in mapping the plausible nutritional contribution of each ingredient, not in making therapeutic claims for the chutney as a whole.

9. Conclusion

Pudina chutney made from mint, coriander, sesame seeds, tamarind, jaggery, and lemon brings together six ingredients that are each independently well studied for their vitamin, mineral, and phytochemical content, and for associated antioxidant, anti-inflammatory, digestive, antimicrobial, and cardiometabolic properties. Taken together, the chutney looks like a nutrient-dense, low-portion functional food adjunct, consistent with the broader recognition of Indian chutneys and pickles as functional foods in the scientific literature. Getting the most out of it in practice comes down to preparation choices—lightly roasting the sesame, grinding the herbs raw rather than cooking them, balancing the jaggery-to-acid ratio, and storing it briefly in the fridge—that preserve the heat- and time-sensitive compounds discussed in this review. Future work that analytically characterises the finished chutney, and clinical studies of its regular consumption, would help turn this ingredient-level evidence into direct, product-specific health claims.

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