CHAPTER VI

STANDARDIZATION OF SOUTH INDIAN RECIPES 
INCORPORATED WITH *Pisonia grandis R.Br.* 
FRESH LEAVES

6.1. THE BROAD METHODOLOGY ADOPTED FOR THIS 
CHAPTER OF THE STUDY IS DETAILED BELOW:-

6.1.1. Selection of the recipes:

Enough care was taken to decide on the recipe. A primary list of 
recipes was prepared. This list was shortlisted based on:

- Method and ease of preparation.
- Quantum of *Pisonia grandis* required.
- Recipes that involved different cooking methods, like boiling, 
stewing & shallow frying.

Accordingly, Soup, Chappathi, Sambar, Kozhukattai, Poriyal, Masiyal, 
Adai and Bread-sandwich were tried out. The recipes were prepared 
considering the diabetic population. The method of preparation for 
the selected recipes are discussed in the following paragraphs.

6.1.2. Standardizing the recipes:

An initial try was given to the recipes that were decided. Then the 
outcome of the prepared items was evaluated for taste, consistency, 
flavor, mouth feel, colour and appearance.

Suggestions and hints given to improvise the dish by the experts were 
taken into consideration and the final study was carried out. Each 
dish was prepared for 15 servings and then values were calculated for 
one serving.
6.1.3. Calculation of nutrient content per serving:

The essentials nutrients like calories, protein, fat, fibre, carbohydrates, iron, calcium, sodium, potassium, vitamin-A, thiamine, riboflavin, niacin and vitamin-C were calculated using the book Nutritive Value of Indian Foods, published by National Institute of Nutrition, Hyderabad (1988). The nutritive value of *Pisonia grandis* R. Br. leaves was taken from the Tamil Nadu Agricultural University, Coimbatore.

6.1.4. Calculation of cost per serving:

The cost of all the ingredients used for preparing each dish was noted and the cost for one serving was worked out. Time, fuel and human energy spent for preparation was not taken into consideration for cost valuation.

6.1.5 Conducting sensory evaluation for the recipes prepared:

The panel members were selected from the age of 30 to 35 years and they are free from health disorder and especially free from cold and cough. The 30 selected panel members were asked to evaluate the prepared items for taste, flavor, mouthfeel, colour and appearance on 4-point hedonic scale.

The four point hedonic rating scale was used to evaluate the selected recipes. The rating was fixed to Excellent, Good, Fair and Poor and the scores were given to each category of rating scale was 4, 3, 2 and 1 respectively. Panel members were briefed about the *Pisonia grandis* R. Br. leaves and its applications and then were asked to fill the evaluation form. The questionnaire was enclosed in Appendix-X. The data were consolidated using MS-Excel Sheet.
6.2. RESULTS AND DISCUSSION

The results were obtained in Standardization of South Indian recipes incorporated with *Pisonia grandis R.Br.* fresh leaves are discussed at length in the following paragraphs. This fulfils the Objective 4 of the study viz. “To develop the recipes using *Pisonia grandis R.Br* leaves and evaluate organoleptically the standardized recipes”.

Diet plays an amazing role in various modalities of treatment used in the management of diabetes mellitus, because it does not produce any adverse effects. Unfortunately, only ten percent of the diabetic population controlled their hyperglycemic levels by diet. *Mani et al (1997)* reiterate that intake of OHD along with insulin to achieve normoglycemia proved effective only for a shorter period unless it was accompanied by a well planned and appropriate diet therapy. In addition to many studies that proved Oral Hypoglycemic Drugs (OHA) and Insulin also need meal planning to achieve/control the normoglycemia. The standardization of recipes in the present study was tuned to address the common middle class diabetic population. The selected recipes with ingredients used and method of preparation are presented in the following paragraphs. The selected recipes were:

(i) Sambar  
(ii) Soup  
(iii) Adai  
(iv) Chappathi  
(v) Poriyal  
(vi) Masiyal  
(vii) Dumplings
6.2.1. Procedures adopted for Standardization of South Indian recipes incorporated with fresh *Pisonia grandis* R.Br. leaves

**ADAI**

**Ingredients:**

- Ragi flour 100g
- *Pisonia grandis* leaves 50 g
- Garlic 5g
- Aniseeds 2g
- Red chilly 2 g
- Mustard seeds 2g
- Uraddhal 2g
- Asafoetida a pinch
- Salt as required

**Method of preparation:**

- Clean and wash the *Pisonia grandis* leaves and chop it finely.
- Chop the onion into fine pieces, then grind the garlic, aniseeds and red chilly into paste, keep it aside.
- Heat 1 tsp of oil, when the oil is hot add mustard seeds, when it crackles add urad dal, asafoetida, curry leaves, then add onion and Nachukottai keerai.
- Sauté few minutes until the leaves reduce it size. Remove the pan from heat and allow the mixture to cool.
- In a bowl add ragi flour, sautéed nachukottati keerai and garlic paste along with salt.
- Slowly add water in little quantities to the flour until the dough becomes very soft. Spread the dough with fingers and heat a griddle or tawa. When griddle gets hot add 1 tsp oil in the center of tawa.
Take large lemon sized dough, place it in the center of white cotton cloth and start pressing dough with fingers until a circular and slightly thin adai is formed.

Carefully remove adai dough to your palm and place it in the center of tawa. Cook ragi adai on both sides until slightly browned and crisp (if required you can smear some more oil around adai).

Remove ragi Nachukottai keerai leaves adai on to plate and serve hot with Vengaya Sambar

**Preparation time** : 20min

**Portion size** : 3 nos

**Cost per serving** : Rs. 6
PORIYAL

Ingredients:

- *Pisonia grandis* leaves 30 g
- Drumstick leaves 30 g
- Vadanaryana keerai 30 g
- Onion 40 g
- Garlic 5 g
- Pepper 5 g
- Gingelly oil 10 g
- Salt as required

Method of preparation:

1. Wash the murungai keerai, vadanarayan leaves and *pisonia grandis* leaves, take out the leaves one by one without any sticks or yellow leaves.
2. And chop the onions and *pisonia grandis* leaves finely.
3. Heat oil in a kadai and add the mustard seeds, urad dal and red chilly.
4. when it starts spluttering add the finely chopped onion and crushed garlic and saute for few minutes.
5. When it turns pink add the chopped keerai and add salt.
6. Mix well and cook it for 5 mins.
7. Serve hot with rice.

Preparation time : 20 min

Portion size : 300 ml measuring cup

Cost per serving : Rs- 5
**SAMBAR**

**Ingredients:**

- *Pisonia grandis* leaves: 100g
- Red gram dhal: 50g
- Onion: 25g
- Tomatoes: 40g
- Cumin seeds: 1 tsp
- Urad dal: 1/2 tsp
- Garlic flakes: 4 Nos.
- Mustard: 1 tsp
- Asafoetida: a pinch
- Oil: 10 gms
- Salt to taste

**Method of Preparation:**

- Wash the Nachukottai keerai and cut it evenly
- Then chop the onion and tomatoes. Keep it aside.
- Pressure cooks the dhal.
- Heat oil in a kadai and add the mustard seeds, urad dal and red chilli.
- When it starts spluttering add the finely chopped onion, when it turns pink add the tomatoes and crushed garlic and saute for few minutes.
- Add the cooked dhal and add salt. Allow them to boil for 15 min.
- Finely add the chopped Nachukottai leaves in sambar.
- Serve it rice.

**Preparation time**: 10 min

**No of serving**: 5 members

**Cost per serving**: Rs. 7
KOZHUKATTAI

**Ingredients:**

- Parboiled rice 25g
- Green gram dhal 25g
- *Pisonia grandis* leaves 10g
- Red chilli 1g
- Garlic 2g
- Ginger 2g
- Asafoetida a pinch
- Mustard seeds 2g
- Urad dhal 2g
- Curry leaves 2g
- Salt as required

**Method of preparation:**

- Soak the rice and moong dhal for 2 hours.
- Grind the rice, red chilli, ginger, and garlic and moong dhal into coarse batter.
- Add the salt in the batter.
- Wash and clean the pisonia grandis leaves and remove the center nerves of the leaves.
- Spread the batter in the leaves. Fold the leaves.
- Steam the dumplings in the Idly cooker for 20 min.
- After the dumplings got cooked.
- Seasoned with mustard, red chilli, urad dhal, curry leaves and asafoetida.

**Preparation time**: 40 min

**Portion size**: 10 nos.

**Cost per serving**: Rs.3
MASIYAL

Ingredients:

- Red gram dhal 25 g
- Moong dhal 25 g
- *Pisonia grandis* leaves 200 g
- Onion 30 g
- Coconut 30 g
- Garlic 5 cloves
- Cumin seeds 5 g
- Oil 10 g
- Red chillies 2 g
- Mustard seeds 5 g
- Urad dhal 2 g
- Asafoetida a pinch
- Salt as required

Method of preparation:

- Wash the *Pisonia grandis* leaves and chop it.
- Now wash the moong dal and red gram dhal and keep it in pressure cooker.
- Heat the oil, add the onion and minced garlic, sauté it till onion became translucent and then add chopped *Pisonia grandis* leaves. Now pour 1/2 cup water and add salt. Mix it well.
- Cook all the ingredients. Once the leaves get cooked in 5 minutes and the dhal without mashing.
- Grind the coconut and cumin seeds together.
- Add this mixture to the masiyal.
- For seasoning, heat the oil. Add mustard seeds, cumin seeds, red chills, asafoetida and urad dal. Serve it with rice

Preparation time : 20 min
No of servings : 5 members (50ml catorie)
Cost of per serving : Rs. 7
SOUP

Ingredients:

- *Pisonia grandis* leaves 100g
- Onion 40g
- Foxtail millet 5g
- Moong dhal 5g
- Garlic 2g
- Oil 5g
- Pepper 2g
- Salt as required

Method of preparation:

- Heat the oil in a pan; add the onions and garlic and sauté till the onions are translucent.
- Add the chopped *Pisonia grandis* leaves and sauté for a few minutes. Add 2 cups of water and salt and pepper.
- Allow it to come to a boil and simmer till the leaves are tender.
- Dry roast foxtail millet and moong dhal and grind into the powder.
- Once the leaves get cooked add the grinded powder into the soups.
- Boil the soup and the consistency gets thicker.
- Turn off the flame. Serve hot.

Preparation time : 15 min

No. of servings : 5 (200ml each)

Cost per serving : Rs. 7.
CHAPPATHI

Ingredients:

- Whole wheat flour 100 g
- Pisonia grandis leaves 50 g
- Garlic cloves, (finely chopped) 2 g
- Oil 10 g
- Water as required
- Salt as required

Method of preparation:

1. Rinse the *Pisonia grandis* leaves well. Drain them completely. Chop the methi leaves finely and keep aside.
2. In a bowl, add the wheat flour, chopped *Pisonia grandis* leaves, green chilies, garlic, oil and mix.
3. Pour some water and knead to smooth dough. Make medium sized balls of the dough. Roll the dough into medium sized rounds.
4. On a tava or frying pan, cook the chappathies with some oil, till they are browned and cooked on both sides.
5. Serve hot chappathi with some tomato chutney with raitha.

Preparation time: 15 min.

Portion size: 4 Nos.

Cost per serving: Rs. 3
6.2.2. The weighed mean of four point hedonic rating scale and the nutritive value of the *Pisonia grandis* R.Br. leaves are under the following Table 6.1

Table 6.1: Weighed Mean of Four Point Hedonic Rating Scale (Poor to Excellent)

<table>
<thead>
<tr>
<th>Recipes</th>
<th>Taste</th>
<th>Texture</th>
<th>Appearance</th>
<th>Consistency</th>
<th>Flavour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sambar</td>
<td>4</td>
<td>-</td>
<td>4</td>
<td>3.38</td>
<td>3.8</td>
</tr>
<tr>
<td>Soup</td>
<td>3.1</td>
<td>-</td>
<td>3.4</td>
<td>3.4</td>
<td>3.2</td>
</tr>
<tr>
<td>Adai</td>
<td>3.7</td>
<td>3.37</td>
<td>2.86</td>
<td>-</td>
<td>3.83</td>
</tr>
<tr>
<td>Chappathi</td>
<td>3.5</td>
<td>3.2</td>
<td>3.2</td>
<td>-</td>
<td>2.8</td>
</tr>
<tr>
<td>Poriyal</td>
<td>3.1</td>
<td>3.2</td>
<td>2.23</td>
<td>-</td>
<td>2.47</td>
</tr>
<tr>
<td>Masiyal</td>
<td>3.6</td>
<td>-</td>
<td>3.37</td>
<td>3.5</td>
<td>2.73</td>
</tr>
<tr>
<td>Dumplings</td>
<td>1.2</td>
<td>1.23</td>
<td>2.8</td>
<td>-</td>
<td>1.3</td>
</tr>
</tbody>
</table>

Figure 16: Weighed Mean of Four Point Hedonic Rating Scale (Poor to Excellent)
The results obtained from organoleptic evaluation of foods using *Pisonia grandis* leaves reported by the panel members are discussed below. Sambar and soup scored 4 and 3 for consistency, taste, appearance, and flavour. The other recipes also scored 3 but the dumplings scored 1 due to hardness of the outer coating made of rice flour. The same is explained in Figure 16.

### 6.2.3. Calculation of nutrient content of the selected recipes:

According to the dietary guidelines of Nutritive value of Indian foods (2011) revealed that the therapeutic diets are based on nutrient composition and food groups which can be used in menu planning. Based on these guidelines the selected leaves incorporated in simple south Indian dishes which are widely consumed by all age groups and different activity group. The essentials nutrients like Calories, Protein, Fat, Carbohydrates, Iron, Vitamin-C were calculated using the Nutritive Value of Indian Foods, published by National Institute of Nutrition, Hyderabad (1988).

**Table 6.2: Consolidated nutritive value of the selected recipes**

<table>
<thead>
<tr>
<th>Items</th>
<th>Energy (K.cal)</th>
<th>Protein (g)</th>
<th>Fat (g)</th>
<th>Calcium (mg)</th>
<th>Iron (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sambar - 200ml</td>
<td>122.89</td>
<td>7.02</td>
<td>3.64</td>
<td>173.84</td>
<td>11.08</td>
</tr>
<tr>
<td>Soup - 200ml</td>
<td>50.2</td>
<td>2.84</td>
<td>0.47</td>
<td>220.64</td>
<td>17.44</td>
</tr>
<tr>
<td>Poriyal - 50gm</td>
<td>63.16</td>
<td>7.03</td>
<td>1.09</td>
<td>353.64</td>
<td>25.16</td>
</tr>
<tr>
<td>Chappathi - 3nos.</td>
<td>191.5</td>
<td>2.36</td>
<td>1.71</td>
<td>205.22</td>
<td>25</td>
</tr>
<tr>
<td>Adai - 3nos</td>
<td>400.9</td>
<td>2.46</td>
<td>1.05</td>
<td>395.46</td>
<td>17.22</td>
</tr>
<tr>
<td>Masiyal -100ml</td>
<td>99.03</td>
<td>7.00</td>
<td>5.52</td>
<td>237.68</td>
<td>15.70</td>
</tr>
</tbody>
</table>

Among the prepared recipes, soup provides very less amount of energy and fat content, but it provides good amount of calcium and Iron in 200 ml of soup. Regarding the nutritive value calculation, it was observed that the sambar and adai provides more amount of energy
when compared to other recipes, but iron and calcium content of selected recipes was adequate for a single serving. The other recipes like masiyal, chappathi and poriyal provides good amount of the nutrients and the selected recipes were economically feasible.

Adai provides 16 percent of energy from the Recommended Dietary Allowances (RDA) of sedentary male workers and chappati provides 7 percent of energy from the day’s requirements of sedentary male workers. The chappathi and Poriyal provides 83 percent of the iron of the day’s requirement and ninety nine percent of calcium provided by adai of the day’s requirements.

**Plate 9: Standardizing recipes using *Pisonia grandis R.Br.* leaves**