



## Quality evaluation of goat milk Shrikhandwadi enriched with papaya pulp, banana pulp and ashwagandha powder

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### Abstract

Shrikhandwadi is a solid mass prepared from the milk chakka with addition of sugar and desiccating the mass to obtained the semi hard mass, and it was cut in to sizeable pieces. Prepared shrikhandwadi used 125% sugar by weight of chakka and also 2% ashwagandha powder by weight of chakka for all treatments as well as the goat milk chakka (60-100%), papaya pulp (5-20%) banana pulp (5-20%) used as different proportion in various treatments. The main objective of this study was to develop shrikhandwadi and analysis their overall acceptability, microbial analysis and shelf-life study of final prepared product.

In the sensory evaluation of final product shrikhandwadi was studied by 9-point hedonic scale with panel members. In the organoleptic evaluation determined the colour and appearance, taste and flavour, body and texture as well as overall acceptability of the product. The score of overall acceptability in control sample S<sub>0</sub> was 8.70, and it was highest score, as well as the highest score of overall acceptability in treatment No. S<sub>xiii</sub> it was 8.50, the addition of goat milk chakka, papaya pulp with banana pulp (65:20:15) in the goat milk chakka had significant effect on overall acceptability of the final developed product shrikhandwadi.

**Keywords:** Shrikhandwadi, goat milk chakka, papaya pulp, banana pulp, ashwagandha powder

### Introduction

Milk and dairy products have long been recognized as essential components of a healthy diet. Furthermore, evidence of health benefits associated with the presence of certain components or microorganisms in milk products is gaining scientific respect (Nagpal *et al.*, 2012) [11]. Nutritional value may be evaluated and tested by using milk protein, which is the most essential nutritional component in goat milk. There are three types of proteins found in goat milk: 70% of it is water-insoluble casein, 25% is water-soluble whey, and 5% is fat-soluble milk fat globule membrane. (Li *et al.*, 2020) [10]. As a dietary supplement, goat's milk provides a wide range of nutrients that are readily absorbed by the body. There is no milk from any other animal that comes close to the likeness of goat's milk to human milk, and goat's milk also offers several medical benefits (Abbas *et al.*, 2014) [1]. The shrikhandwadi was prepared from the goat milk chakka which was obtained from goat milk curd after removing whey. The soft curd of goat milk may also be beneficial to adults with gastrointestinal issues and ulcers, according to a study. Infants, the elderly, and those undergoing medical treatment should drink goat milk. Goat milk and its products are said to be well-liked by consumers. A surge in the production of goat cheese in Nepal will be a windfall to the country's dairy sector. Even if this is the case, goats have been mostly ignored in research and development efforts (Bhattarai 2012) [3]. The Fermented milk from goats' consumption it increases the anti-atherogenicity also it resistance of lipoprotein fraction to oxidation, oxidized LDL, 8-isoprostanes, peroxidized lipoproteins had lower in level

and increased the total activity of antioxidant (Kullisaar *et al.*, 2003) [9]. Yogurt from milk of goat is excellent provide the fatty acids, minerals as well as protein as a source, but however it's not good acceptance through consumers because of its flavor obtained from caprylic, caprioic and capric acids is present in this milk as well as milk products (Costa *et al.*, 2014) [5].

There are several species of the genus *Musa*, which belongs to the family *Musaceae*, that are often referred to as bananas (Khoozani *et al.*, 2019) [8]. There are a number of health benefits to eating bananas that include a high concentration of nutrients like carbohydrates and sugar as well as vitamins A and C. Plantains are low in protein but abundant in carbs, vitamins, and minerals. Bananas are a good source of vitamin B complex, vitamin A, manganese, vitamin C, potassium, and digestible dietary fibres in large amounts (Ashok kumar *et al.*, 2018) [2].

One of most important plant *Papaya* (*Carica papaya* Linn) is from family *Caricaceae* (Seshamamba *et al.*, 2018) [13].

The papaya can be referred as high nutritive food, as it provides much more nutritional composition on per calorie basis as compared to other foods. The chemical composition as well as the mineral and vitamin. It is virtually entirely devoid of cholesterol and fat, despite the fact that it does include a little amount of protein. When papaya is ripe, it contains mostly invert sugars, which are readily absorbed and digested by the body. Ripe fruit can therefore easily boost body's energy (Saeed *et al.*, 2014) [12].

Ashwagandha root extract at high concentrations safely and efficiently increases stress resistance and, as a result, enhances quality of life as judged by the person

(Chandrasekhar et, al., 2012) [4]. Ashwagandha has been shown to have immunomodulatory, anti-inflammatory, anti-stress, memory boosting, antiparkinsonian, hypolipidemic, antibacterial, cardiovascular, antioxidant, anticancer, and adaptogenic activities (John 2014) [7].

The impact of various processing methods, sugar content, and skim milk powder on the sensory characteristics, textural profile, and near-composition of shrikhandwadi. Shrikhandwadi was made by combining standardised buffalo milk with or without skim milk powder, as well as adding sugar in a variety of forms and amounts (Gaware 2019) [6].

**Materials and Methods**

The study was carried out at Warner College of Dairy Technology, Sam Higginbottom University of Agriculture, Technology, and Sciences, Prayagraj (Allahabad), Uttar Pradesh, Department of Dairy Technology (India).

**Treatment Combination**

Treatment combination of *shrikhandwadi* was prepared from goat milk chakka, papaya pulp and banana pulp. In that sugar and ashwagandha powder was taken by weight of chakka in all treatments content was 125% sugar and 2% ashwagandha respectively.

**Table 1:** Treatment combination of shrikhandwadi

| Treatment No.     | Treatments Combination                                   |
|-------------------|--|
| S <sub>0</sub>    | 100% Goat milk Chakka                                    |
| S <sub>i</sub>    | 90% goat milk chakka + 5% banana pulp + 5% papaya pulp   |
| S <sub>ii</sub>   | 85% goat milk chakka + 5% banana pulp + 10% papaya pulp  |
| S <sub>iii</sub>  | 80% goat milk chakka + 5% banana pulp + 15% papaya pulp  |
| S <sub>iv</sub>   | 75% goat milk chakka + 5% banana pulp + 20% papaya pulp  |
| S <sub>v</sub>    | 85% goat milk chakka + 10% banana pulp + 5% papaya pulp  |
| S <sub>vi</sub>   | 80% goat milk chakka + 10% banana pulp + 10% papaya pulp |
| S <sub>vii</sub>  | 75% goat milk chakka + 10% banana pulp + 15% papaya pulp |
| S <sub>viii</sub> | 70% goat milk chakka + 10% banana pulp + 20% papaya pulp |
| S <sub>ix</sub>   | 80% goat milk chakka + 15% banana pulp + 5% papaya pulp  |
| S <sub>x</sub>    | 75% goat milk chakka + 15% banana pulp + 10% papaya pulp |
| S <sub>xi</sub>   | 70% goat milk chakka + 15% banana pulp + 15% papaya pulp |
| S <sub>xii</sub>  | 65% goat milk chakka + 15% banana pulp + 20% papaya pulp |
| S <sub>xiii</sub> | 75% goat milk chakka + 20% banana pulp + 5% papaya pulp  |
| S <sub>xiv</sub>  | 70% goat milk chakka + 20% banana pulp + 10% papaya pulp |
| S <sub>xv</sub>   | 65% goat milk chakka + 20% banana pulp + 15% papaya pulp |
| S <sub>xvi</sub>  | 60% goat milk chakka + 20% banana pulp + 20% papaya pulp |

(\*125% sugar and 2% ashwagandha powder used by weight of chakka for all treatments)

**Manufacturing of Shrikhandwadi**

Shrikhandwadi was prepared by the using different treatment combination of goat milk chakka, banana pulp, papaya pulp with constant of ashwagandha powder as well as sugar. The manufactured curd by using the starter culture was (curd culture 2%).

**Preparation of curd**

Standardized goat milk (6% fat and 9% SNF) is heated to 80<sup>0</sup> C and then cooled to 28-30<sup>0</sup> C. It is then inoculated @ 2% with the curd culture, which was mixed well, and incubated at 28-30<sup>0</sup> C for 15- 16 hours.

**Preparation of Chakka**

The curd so formed is broken and placed in a muslin cloth bag and hang on a peg for the removal of whey for 8-10 hours, during this period, the whey from the curd will drain off and the solid mass thus obtained is called Chakka, which is the shrikhandwadi base.

**Preparation of shrikhandwadi**

The control sample was prepared by the addition of sugar in chakka and mixed it well also the experimental shrikhandwadi was prepared by the addition of sugar as well as the papaya pulp, banana pulp and ashwagandha powder as per the treatment’s combinations. After mixing the whole mass is transferred in to pan for desiccating in that temperature was about 70<sup>0</sup> C for 10 – 20 min. Then total solid mass was spread on shallow plate and cool them 10-15<sup>0</sup>C after that cut into sizeable rectangular pieces. Then prepared shrikhandwadi stored in room temperature.

**Results and Discussion**

**A. Organoleptic Evaluation of Color & appearance, Body and Texture and Flavour & Taste of Developed product Shrikhandwadi**

**Table 2:** Table showing the Organoleptic Evaluation of Color & appearance, Body & Texture and Flavour & Taste of Developed product Shrikhandwadi

| Treatments        | Color & Appearance | Body and Texture | Flavour and Taste |
|-------------------|--------------------|------------------|-------------------|
| S <sub>0</sub>    | 8.8                | 8.6              | 8.7               |
| S <sub>i</sub>    | 7.1                | 6.2              | 7                 |
| S <sub>ii</sub>   | 7.2                | 6.3              | 7.1               |
| S <sub>iii</sub>  | 7.4                | 6.4              | 6.9               |
| S <sub>iv</sub>   | 7.3                | 6.6              | 7.0               |
| S <sub>v</sub>    | 7.5                | 7.2              | 7.2               |
| S <sub>vi</sub>   | 7.1                | 7.3              | 7.3               |
| S <sub>vii</sub>  | 7.2                | 7.3              | 7.2               |
| S <sub>viii</sub> | 7.5                | 7.7              | 7.6               |
| S <sub>ix</sub>   | 7.8                | 7.9              | 7.9               |
| S <sub>x</sub>    | 8.0                | 8.1              | 8.2               |
| S <sub>xi</sub>   | 8.4                | 8.4              | 8.3               |
| S <sub>xii</sub>  | 8.6                | 8.5              | 8.6               |
| S <sub>xiii</sub> | 7.8                | 7.8              | 7.6               |
| S <sub>xiv</sub>  | 7.6                | 7.5              | 7.4               |
| S <sub>xv</sub>   | 7.5                | 7.3              | 7.3               |
| S <sub>xvi</sub>  | 7.4                | 7.2              | 7.2               |
| Minimum           | 7.1                | 6.2              | 6.9               |
| Maximum           | 8.6                | 8.5              | 8.7               |
| F test            | S                  | S                | S                 |
| S. Ed (±)         | 0.085              | 0.078            | 0.063             |
| C. D. (P = 0.05)  | 0.168              | 0.156            | 0.126             |

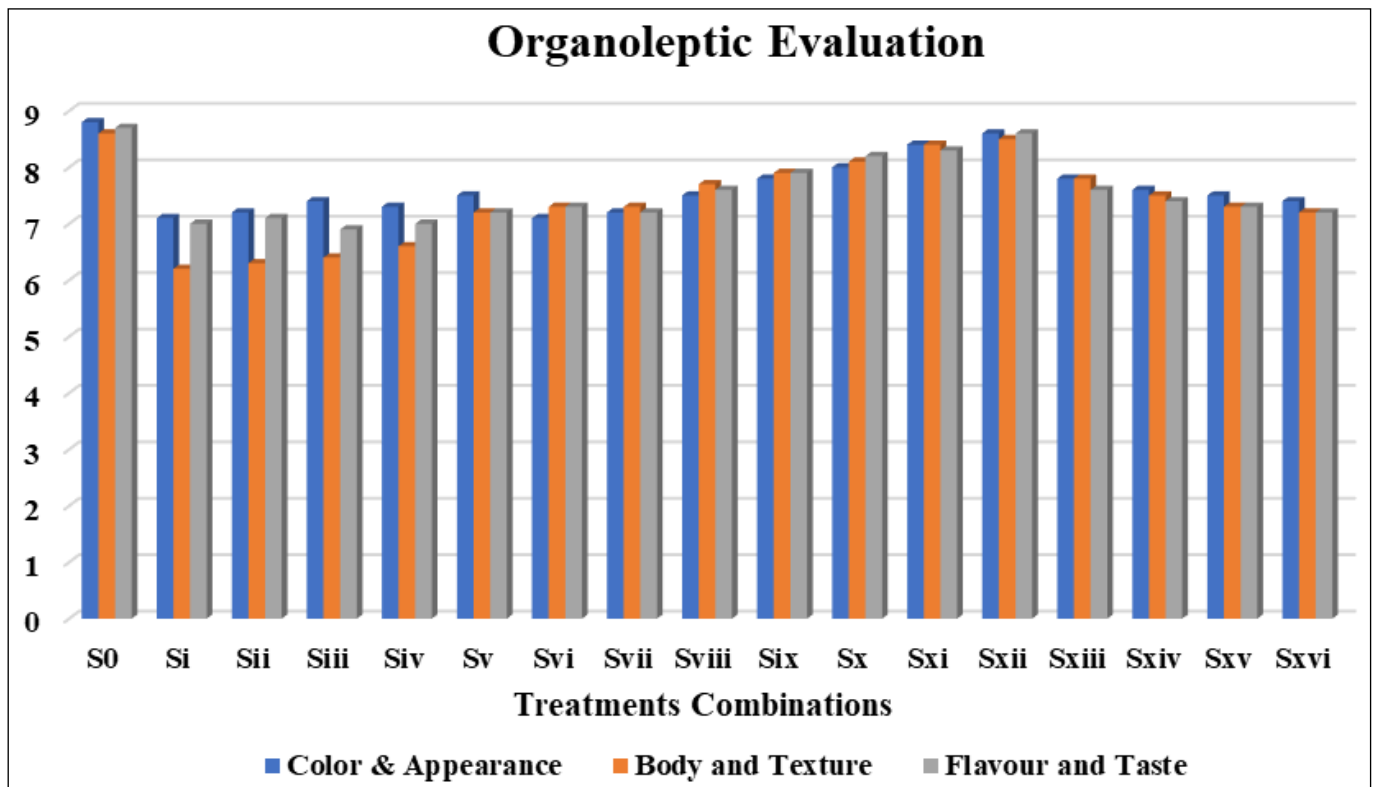


Fig 2: Graphical representation of Color & appearance, Body and Texture and Flavour & Taste score of shrikhandwadi

The organoleptic evaluation of final product shrikhandwadi was studied by 9 point hedonic scale with panel members. In the organoleptic evaluation determined the color and appearance, taste and flavour, body and texture as well as overall acceptability of the product.

The color and appearance were analyzed by the using 9-point hedonic scale with panel members. It was noted that the score of color and appearance in control sample S<sub>0</sub> was 8.80, and it was highest score as compared to other treatments, as well as the highest score of color and appearance in treatment No. S<sub>xii</sub> it was 8.60 as compared to other treatments, the addition of papaya pulp with banana pulp (20:15%) in the goat milk chakka had significant effect on color and appearance of the final developed product shrikhandwadi and the lowest score of color and appearance in the treatment No. S<sub>vi</sub> it was 7.10 through panel members was shown in Table No.2. The body and texture were analyzed by the using 9-point hedonic scale with panel members. It was noted that the score of body and texture in control sample S<sub>0</sub> was 8.60, and it was highest score as compared to other treatments, as well as the highest score of color and appearance in treatment No. S<sub>xii</sub> it was 8.50 as compared to other treatments, and the lowest score of body and texture in the treatment No. S<sub>i</sub> it was 6.20 through panel members was shown in Table No.2. The taste and flavour were analyzed by the using 9-point hedonic scale with panel members. It was noted that the score of taste and flavour in control sample S<sub>0</sub> was 8.70, and it was highest score as compared to other treatments, as well as the highest score of taste and flavour in treatment No. S<sub>xii</sub> it was 8.60 as compared to other treatments, the addition of papaya pulp with banana pulp (20:15%) in the goat milk chakka had significant effect on taste and flavour of the final developed product shrikhandwadi and the lowest score of taste and flavour in the treatment No. S<sub>iii</sub> it was 6.90 through panel members.

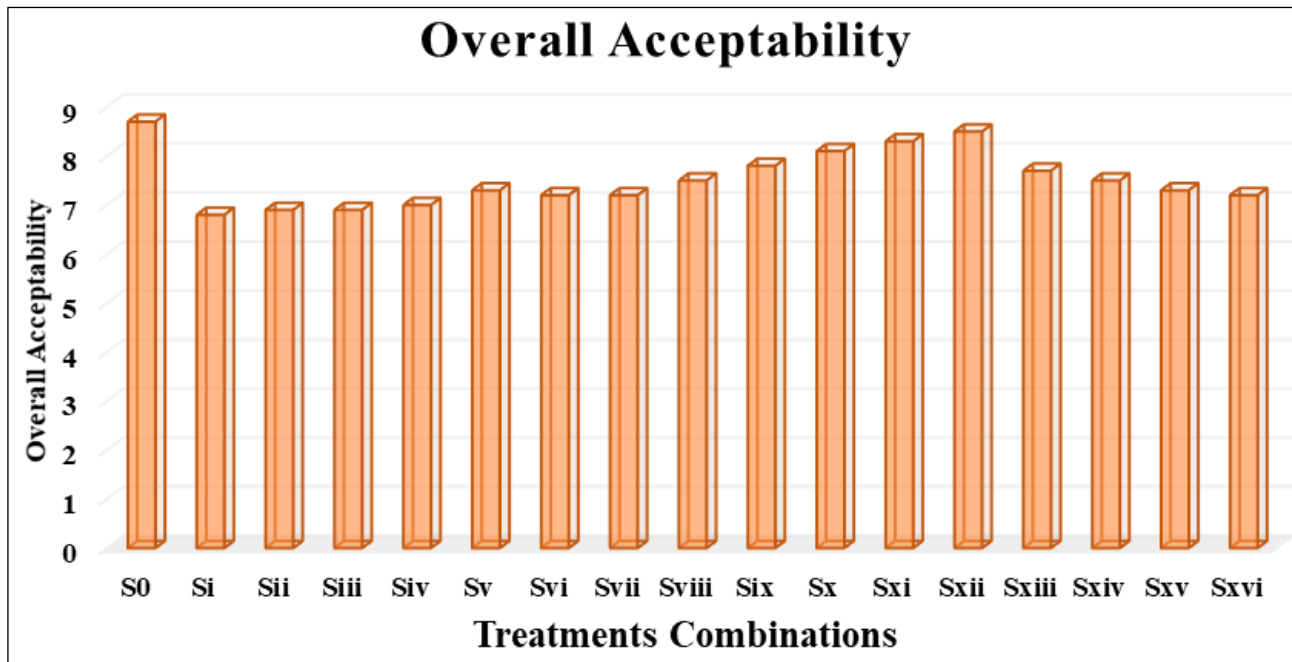
Data of average of Color & appearance, Body and Texture and Flavour & Taste score of shrikhandwadi were statistically analyzed to find out the significant difference between the treatments showed in the table No. 2

The table No. 2 also showing the values of F. Cal. are more than F. Tab's value. at 5 % significant level on their respective d. f.

**B. Organoleptic Evaluation of Overall Acceptability of Developed product Shrikhandwadi**

Table 3: Table showing the Organoleptic Evaluation of Overall Acceptability of Developed product Shrikhandwadi

| Treatments        | Overall Acceptability |
|-------------------|-----------------------|
| S <sub>0</sub>    | 8.7                   |
| S <sub>i</sub>    | 6.8                   |
| S <sub>ii</sub>   | 6.9                   |
| S <sub>iii</sub>  | 6.9                   |
| S <sub>iv</sub>   | 7.0                   |
| S <sub>v</sub>    | 7.3                   |
| S <sub>vi</sub>   | 7.2                   |
| S <sub>vii</sub>  | 7.2                   |
| S <sub>viii</sub> | 7.5                   |
| S <sub>ix</sub>   | 7.8                   |
| S <sub>x</sub>    | 8.1                   |
| S <sub>xi</sub>   | 8.3                   |
| S <sub>xii</sub>  | 8.5                   |
| S <sub>xiii</sub> | 7.7                   |
| S <sub>xiv</sub>  | 7.5                   |
| S <sub>xv</sub>   | 7.3                   |
| S <sub>xvi</sub>  | 7.2                   |
| Minimum           | 6.8                   |
| Maximum           | 8.7                   |
| F test            | S                     |
| S. Ed. (±)        | 0.081                 |
| C. D. (P = 0.05)  | 0.162                 |



**Fig 2:** Graphical representation of Overall acceptability score of shrikhandwadi

The overall acceptability was analyzed by the using 9-point hedonic scale with panel members, showed in the table No 3. It was noted that the score of overall acceptability in control sample S<sub>0</sub> was 8.70, and it was highest score as compared to other treatments, as well as the highest score of overall acceptability in treatment No. S<sub>xii</sub> it was 8.50 as compared to other treatments, the addition of papaya pulp with banana pulp (20:15%) in the goat milk chakka had significant effect on overall acceptability of the final developed product shrikhandwadi and the lowest score of overall acceptability in the treatment No. S<sub>i</sub> it was 6.80 through panel members.

Data of average of overall acceptability score of shrikhandwadi were statistically analyzed to find out the significant difference between the treatments showed in the table No. 3

The table No. 3 also showing the values of F. Cal. are more than F. Tab's value. at 5 % significant level on their respective d. f.

### Conclusion

The present study was carried out to develop the product Shrikhandwadi from different level of goat milk chakka, papaya pulp and banana pulp with ashwagandha powder. In the addition of concentration of goat milk chakka, papaya pulp and banana pulp with 125% sugar and 2% ashwagandha powder by weight of chakka. In that the different treatments of shrikhandwadi concluded that the best sample in overall acceptability, colour and appearance, taste and flavour on the basis of 9-point hedonic scale was that the treatment no S<sub>xii</sub> was best sample in overall acceptability.

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### References

1. Abbas H, Hassan F, Mona A, Enab A. Physicochemical Characteristics of Goat's Milk, Life Science Journal,2014;11(1s):307-317.
2. Ashok kumar K, Elayabalan S, Shobana V, Sivakumar P, Pandiyan M. Nutritional value of cultivars of Banana (Musa spp.) and its future prospects Journal of Pharmacognosy and Phytochemistry,2018;7(3):2972-2977.
3. Bhattarai R. Importance of Goat Milk J. Food Sci. & Technol. Nepal,2012;7:107-111.
4. Chandrasekhar K, Kapoor J, Anishetty S. A prospective, randomized double-blind, placebo-controlled study of safety and efficacy of a high-concentration full-spectrum extract of ashwagandha root in reducing stress and anxiety in adults. Indian journal of psychological medicine,2012;34(3):255-262.
5. Costa MP, Balthazar CF, Franco RM, Mársico ET, Cruz AG, Junior CC. Changes on expected taste perception of probiotic and conventional yogurts made from goat milk after rapidly repeated exposure. Journal of dairy science,2014;97(5):2610-2618.
6. Gaware A, Raziuddin M, Zanjad N, Katekhaye A. Studies on Sensory, Textural Profile and Chemical Quality of Buffalo Milk Shrikhandwadi International Journal of Livestock Research,2019;9(2):175-182.
7. John J. Therapeutic potential of Withania somnifera: a report on phyto-pharmacological properties. International Journal of Pharmaceutical sciences and research,2014;5(6):2131-2148.
8. Khoozani AA, Birch J, Bekhit AEDA. Production, application and health effects of banana pulp and peel flour in the food industry. Journal of food science and technology,2019;56(2):548-559.
9. Kullisaar T, Songisepp E, Mikelsaar M, Zilmer K, Vihalemm T, Zilmer M. Antioxidative probiotic fermented goats' milk decreases oxidative stress-mediated atherogenicity in human subjects. British Journal of Nutrition,2003;90(2):449-456.

10. Li X, Cheng M, Li J, Zhao X, Qin Y, Chen D, *et al.* Change in the structural and functional properties of goat milk protein due to pH and heat J. Dairy Sci.,2020;103:1337-1351.
11. Nagpal R, Behare P, Kumar M, Mohania D, Yadav M, Jain S, *et al.* Milk, Milk Products, and Disease Free Health: An Updated Overview, Critical Reviews in Food Science and Nutrition,2012;52:321-333.
12. Saeed F, Arshad MU, Pasha I, Naz R, Batool R, Khan AA, *et al.* Nutritional and phyto-therapeutic potential of papaya (*Carica papaya* Linn.): an overview. International Journal of Food Properties,2014;17(7):1637-1653.
13. Seshamamba B, Malati P, Ruth A, Mallika A, Sharma V. Studies on physicochemical properties & proximate analysis of *Carica papaya* seed Journal of Pharmacognosy and Phytochemistry,2018;7(6):1514-1519.