Abstract

The word ‘Honey’ is derived from the Arabic word ‘han’. This became ‘honing’ in German and ‘honing’ in old English. Honey is also known as ‘miel’ in French and Spanish, ‘honig’ in Dutch, ‘meli’ in Greek, ‘mel’ in Latin, ‘mej’ in Hungarian, ‘meile’ in Italian and ‘madhu’ in Hindi / Sanskrit. It is used in English as a term of ‘endearment’. Honey means the food derived entirely from the work of bees operating upon the nectar of flowers and other sweet exudation of plants. It shall not contain more than (a) 25% of moisture (b) 0.5% ash and (c) 5% of sucrose except in case of Carvia Callosa and honey dew where the maximum sucrose content shall be 10%. The minimum reducing sugar content (expressed as invert sugar) shall be 65% except in case of Carvia Callosa and honey dew where it shall be 60% Fructose / Glucose ratio shall not be less than 0.95 and Fiehe’s test should, ordinarily be negative (Sharma, 2000).

Honey is enjoyable on account of its distinct flavour and taste. It has high viscosity, sweetness and range of colours. It is valued as a food as well as for its therapeutic attributes (Shamala and Jyothi, 1999).

Honey and its source ‘honey bees’ have been associated with human from the time immemorial. From the Vedic references it is well known that Indians knew about the food and medicinal value of honey because of which it was rated next to ‘Amrit’, the Ambrosia only. Chinese in ancient times used honey as superior medicine. Greeks and Egyptians used honey to embalm the dead bodies. It was also used as food for dead and it is reported that in tomb of a queen of Egypt, who was buried over 3000 years ago, a jar of honey was found intact in its chemical composition and its original aroma (Sharma, 2000).

Nutritionally honey is a high energy carbohydrate food considered to be best source of heat and energy giving over 3200 Kcal energy/kg. It provides wholesome nourishment as compared to other foods. The energy value of one kg of honey is approximately estimated to be equal to 19 eggs, 3kg milk, 6.5kg plums, 3.5kg green peas, 5.5kg apples or 7kg carrots (Gopalan et.al, 2004). Being an energy rich food, it becomes a perfect food when consumed with milk.
Medicinally honey is non-irritant, promotes rapid growth of healthy tissues and is useful in pruritus value, bed sores, skin and intestinal disorders. It is very commonly used internally in treatments of cough, cold, hay fever, gastro-intestinal disorders etc. It quickly replenishes the energy lost in various physical activities. Athletes and sportsman, mountaineers, deep-sea drivers, patients in hospitals and workers in factories are some of the special segments of society who requires the honey the most.

Honey is a versatile product that suits all occasions viz. religious ceremonies, spiritual functions, festivals and at the time of birth, marriages and even death. Infact, honey is considered as the food of foods, the drink of drinks, and drug of drugs. Being a versatile product, it is used for creating appetite, strengthening the stomach, eliminating phlegm, as a meat preservative, hair conditioner, eye salve and mouth wash.

Informations on above aspects related to use of honey all over world are lacking in published literature. Most of the research studies in relation to processing and utilization of honey pertain to HMF (hydroxy methyl furfural) formation during storage, effect of heating on HMF and browning, influence of heating (direct heat treatment), storage temperature and period, physico-chemical and sensory qualities of Indian honey, glucose content in honey, total soluble solids (TSS), acidity, pH and standard plate count as affected by different treatments and storage conditions etc. The product development and product characteristics aspects are missing in literature. Keeping in view the above considerations the present research work was planned to develop and evaluate some promising honey based food products in which honey could be substituted in place of white sugar and which have longer shelf life. The specific objectives of the study were:

- To develop and standardize the procedures for manufacturing of selected honey based nutritional food products like honey aonla preserve, honey carrot candy, honey jam, honey chocolate/toffee and honey beverages.
- To study and evaluate the relevant physico-chemical, textural, nutritional, sensory and microbial characteristics of above developed food products.
- To evaluate the shelf life of above products in various packaging materials.
• Statistical and economic analysis for commercialization of developed products.

It is expected that the findings of this study will be utilized by various sections of society for increasing the consumption of medicinal honey as healthy food with additional advantage of ease in consumption, value-addition besides producing therapeutically advantageous designer foods with variety and taste. Such utilization will also encourage establishment of cottage industries and generate newer opportunities of income/employment generation in rural areas and enhance the economic of beekeeping in India.

Federal Food and Durg Administration USA, has given following definition of honey: ‘Honey is the nectar and saccharine exudations of the plants gathered, modified, and stored in the comb by honeybees (Apis mellifera and A. dorsata), is levorotatory, and contains not more than 25 per cent of water, not more than 0.25 per cent of ash, and not more than 8 per cent of sucrose’ (Harry, 2001).

Thus, honey is produced by honeybees. They suck up nectar from flowers or other sweet saps found in living plants, store the nectar in their honey sac, and enrich it with some of their own substances to induce changes. When the bees return to the hive, they deposit the nectar in honeycombs for storage and ripening.

Honey production starts immediately after the flower pollen, nectar and honeydew are collected and deposited in the bee’s pouch (honey sac). The mixture of raw materials is then given to worker bees in the hive to deposit it in the six-sided individual cells of the honeycomb. The changing of nectar into honey proceeds in the cell in the following stages: water evaporates from the nectar, which then thickens; the content of invert sugar increases through sucrose hydrolysis by acids and enzymes derived form bees, while an additional isomerization of glucose to fructose occurs in the honey sac; absorption of proteins from plant and bees, and acid from bee’s body; assimilation of forage minerals, vitamins and aroma substances; and absorption of enzymes from the bee’s salivary glands and honey sacs. When the water content of the honey drops to 16-19%, the cells are closed with a wax lid and ripening continues, as reflected by a continued hydrolysis of sucrose by the enzyme invertase and by the synthesis of new sugars.
On the basis of the source of sweet liquid and also the plant species in case of floral and extra floral nectar, the honey can be classified as floral honey or dew honey. Though mono floro honeys are not common viz, honey can be categorized on the basis of floral source such as Litchi honey, Berseem honey, Eucalyptus honey, Brassica honey etc. It is also very common to name the honeys on the basis of colour.

The honey can also be classified as apiary honey and forest honey. The honey produced by hive bees, *Apis cenara indica* and *Apis mellifera* in apiaries; collected by modern extraction methods is called apiary honey. These are transparent and free from foreign materials. Forest honey includes honey produced by rock bee, *Apis dorsata* or wild nest of *A. cenara indica* in forest and collected by crude methods of squeezing the comb. Such honey is turbid due to presence of lot of pollen, wax, brood, and other parts of bees and plant materials.

According to recovery techniques, following kinds of honey are differentiated:

(a) Comb Honey (honey with waxy cells), i.e. honey present in freshly built, closed combs devoid of brood combs (young virgin combs). Such honey is produced in high amounts, and is widely available. Darker colored honey is obtained from covered virgin combs not more than one year old and from combs, which include those used as brood combs.

(b) Extracted Honey is obtained with a honey extractor, i.e. by centrifugation at somewhat elevated temperatures of brood-free comb cells. This recovery technique provides the bulk of the honey found in the market. Gentle warming up to 40° C facilitates the release of honey from the combs.

(c) Pressed honey is collected by compressing the brood-free honeycombs in a hydraulic press at room temperature.

(d) Strained honey is collected from brood-free, pulped or unpulped honeycombs by gentle heating followed by pressing.

(e) Beetle honey is recovered by pulping honeycombs, which include brood combs. This type of honey is used only for feeding bees.

Depending upon the sucrose content honey can also be classified as natural honey and artificial honey. Natural honey is produced by honeybees while artificial honey is mostly inverted sucrose from beet or cane sugar and is produced with or without starch.
sugar or starch syrup. It is adjusted in appearance, odour and flavour to imitate true honey. Depending on the production method, such honeys contain nonsugar constituents, minerals, and sucrose and hydroxymethyl furfural. Artificial honey contains invert sugar (≥50%), sucrose (≤38.5%), water (≤22%), ash (≤0.5%) and, when necessary, saccharified starch products (≤38.5%). The aroma carrier is primarily phenylacetic acid ethyl ester and, occasionally, diacetyl, etc. Hydroxymethyl furfural content is 0.08-0.14%. The product is often coloured with certified food colours. Artificial honey is used as a sweet spread for bread and for making Printen (honey cookies covered with almonds), gingerbread and other baked products.

Certain honey based fruits and vegetables products like honey aonla murabba, honey carrot candy, honey mixed fruit jam, honey aonla squash and honey toffee were developed by replacing white sugar with honey. Experimental studies were carried out to examine the effects of different packaging materials and storage temperature on various physico-chemical, textural, microbiological and organoleptic characteristic of these honey based food products. Shelf life studies of different developed products were also carried out.

Honey and large sized aonla (Variety: Banarsi) were procured from the K.V.K. Aligarh and orchards of the Agricultural Faculty of A.M.U., Aligarh respectively. Carrot, papaya and guava were procured from the local fruits and vegetable's shops. Compositional constituents of honey and fruits and vegetables used in this study were determined before preparation of the honey based food products.

A number of equipments and Apparatus were required to conduct the present study. These included Digital pH meter for pH measurement (Thermo Orion USA), Soxhalete apparatus for fat estimation (Borosil Glass), Laminar flow for microbial studies (Yarco, India), B.O.D. cum humidity chamber (Yorco, India), Autoclave (Pooja Scientific instrument, New Delhi), High Speed Tissue Homogeniser (Yorco, India), Hot Air Oven for moisture content (Tanco, India), Electronic Balance (Anamed, India), Spectrophotometer for determination of browning index (Digital Spectrophotometer Model 310E, India), Atmospheric Packaging Machine (Quick Seal, Sevana, India), and Texture Analyzer for textural properties (TAHD Stable Micro system, England) etc in addition to glassware’s and electronic balances.
For the preparation of Honey Aonla Murabba: One kg Honey was used for the preparation of murabba. The recipe included following:

- Aonla fruit: 1.00 kg
- Honey: 1.00 kg
- Water: 150 ml
- Citric acid: 2-3 g

Fruits were washed with cold water and after the damaged ones were discarded, they were properly cleaned and pricked with stainless steel fork/ knife and immersed in two percent NaCl solution at room temperature. Concentration of the solution was increased by two percent/day and the operation was continued for four days. Fruits were taken out from the NaCl solution after four days and washed thoroughly and dipped in fresh water for 1-2 days. The cleaned fruits were blanched in 1-2% potash alum solution for 4-5 minutes or until separation of segments was observed when the fruits were hand-pressed. After the blanching fruits were washed thoroughly to remove the traces of alum. The blanched fruits were transferred in honey syrup of 55-60°Brix and kept in it for one night. Next day fruits were taken out from the syrup and the syrup was boiled. The syrup was cooled and added again with the fruits. The product was kept again for 24 hours. On third day, the process was repeated with addition of the fruits in hot syrup and the product was kept again for two days at ambient temperature. After two days, the fruits and syrup were boiled together till syrup obtained 68-70°Brix corresponding to temperature of 105-106°C. The product was allowed to cool and packed in clean and sterilized dry glass and PET jars, which were stored in cool and dry place.

For the preparation of Honey Carrot Candy: 750g of honey was used for the preparation of one kg candy. The recipe included following:

- Carrot: 1.00 kg
- Honey: 750 g

After washing, peeling and removing inedible portion, the carrots were pricked with stainless steel fork and cut into pieces of 1.25-1.5 cm. lengthwise. The pieces were blanched in boiling water for 5 minutes and blanched pieces were placed on a dry cloth and excess water was allowed to drain off. The pricked and blanched pieces were soaked in honey syrup at room temperature overnight. Next day, the carrots were taken out from
the syrup and syrup was boiled. The syrup was cooled and added again with carrots. The product was kept again for 24 hrs. On third day, the process was repeated with addition of carrots in hot syrup and product was kept again for 24 hrs. Next day, the carrots and syrup were cooked together till the candies obtained 68°Brix. The pieces were dried at room temperature till non-sticky. The prepared candies were packed and stored.

For the preparation of Honey aonla Squash: 600 ml Aonla fruit juice and 400 ml of honey were used in the preparation of one litre honey aonla squash. The recipe included following:

- Aonla fruit juice — 600 ml
- Honey — 400 ml
- Citric acid — 2 – 3 g
- Kms — 350 ppm

Fruits were washed with cold water and after the damaged ones discarded, they were properly cleaned and heated in boiling water for 15 mins. The seeds were removed and water added in 1:1 ratio. The separated segments were passed through a pulping machine to get pulp. The juice was strained and mixed with honey, citric acid and kms. Now bottling, capping and labeling was done and stored in room temperature or in refrigerator.

For the preparation of Honey Mixed Fruit Jam: 750g of honey was used for the preparation of one kg mixed fruit jam. The recipe included following:

- Papaya — 500 g
- Guava — 500 g
- Honey — 750 g
- Citric acid — 10.0 g

Fully matured, sound and uniform sized fruits were cleaned, washed with tap water and manually peeled and cut into small pieces. The seeds were removed and pieces were passed through mixer to get homogenized pulp. The pulp was concentrated and other ingredients (honey, citric acid) were added. The cooking of pulp was continued till the jam obtained 68.5°Brix. Now bottling and cooling of jam in glass bottles was done and stored in room temperature or in refrigerator.
For the preparation of Honey toffee: Honey (200g) was taken into a boiling pan and heated up to 1 min. then milk powder was added with continuous thorough mixing and heating continued at low flame for 12-15 min. now 24g hydrogenated fat was added and heating was continued for 4-5 min. at low flame. After heating was stopped, the mass thus obtained was spread over stainless steel tray and allowed to cool down for 5 min. The semi solid mass was now fed to the moulding machine for moulding the toffee into the desired shape and size. The toffee thus obtained mass was allowed to dry for 1.5h. After drying, toffee are individually wrapped in metalized polypropylene sheets manually. These wrapped toffees were then packed in LDPE bag of 500g capacities.

After the preparation of sample, Physico-chemical, microbiological, textural and organoleptic characteristic was determined.

Microbial analysis was done aseptically to determine the total plate count of the samples on Nutrient Agar (NA) for bacterial count, Potato dextrose Agar (PDA) for yeast and mold count and Mac Conkey Agar for coliform count.

Sensory attributes such as colour, aroma, texture, taste, juiciness and mouth feel of the honey based products were evaluated as recommended by Ranganna (1994) by Hedonic rating test. A semi-trained panel consisting of 14 judges was selected to evaluate the sample through properly planned experiments. The panelists were selected from the staff and students of Department of Post Harvest Engg. and Technology, Faculty of Agricultural Sciences, AMU, Aligarh.

Texture profile analysis (TPA Test) was done according to

**Fracturability**

Fracturability is defined as the force required to rupture the material and is measured as the force at the first significant break in the first positive bite area.

**Cohesiveness**

Cohesiveness is the property of the material, which determines the extent of deformation. The material withstand file before it ruptures. It is evaluated as the ratio of the positive force area during the second compression cycle to the positive force area during the first compression cycle.
Hardness
It is defined as the force necessary to attain a given deformation and is evaluated as the peak force during the first compression cycle. The hardness of any biological material is an important parameter for its textural evaluation and quality control in terms of maturity, ripeness and storability.

Fracturability = Not all products fracture; but when they do fracture the Fracturability point occurs where the plot has its first significant peak (where the force falls off) during the probe's first compression of the product.

Cohesiveness = $PA_2/PA_1$ (PA_1 and PA_2 are the areas of first and second bite)

Hardness = $h_1$ (Peak force) during first compression

Springiness = Height to which the food recovers between end of the first byte and start of the second byte

Guminess = hardness x Cohesiveness

= $h_1 x PA_2/PA_1$ (Where $h_1$ is the hardness)

Stickiness = -Ve peak force during first compression

Analysis of economics of manufacturing of honey based food product, taking several assumptions into consideration. Following economic indicators were worked out.

(1) Pay back period = \[
\frac{\text{Total capital investment} + \text{Working capital}}{\text{Net annual profit} + \text{Depreciation}}
\]

(2) Return on investment = \[
\frac{\text{Net annual profit}}{\text{Total capital investment} + \text{Working capital}} \times 100
\]

(3) Benefit cost ratio = \[
\frac{\text{Annual benefit}}{\text{Total annual cost}}
\]

(4) Break even point
For x to be brake even point in days
Fixed cost per year + variable cost per day $X x = \text{Revenue per day} \times x$

It is well known that white sugar contains very high amount of sucrose and is an extremely poor food. The excessive consumption of sucrose quite often leads to variety
of health problems, which can be avoided by replacing white sugar with natural sweeteners like honey. Honey is a complex mixture of carbohydrates, several enzymes, amino acids, organic acids, minerals, aroma substances, pigments etc. In comparison to white sugar, honey contains large amounts of fructose and glucose. Honey also has antimicrobial, antifungal, antioxidant properties besides several medicinal properties. Like honey, the fruits and vegetables used in this study also have therapeutic value and uses. Aonla fruit is highly nutritive and it is richest source of vitamin C. Fruits are also utilized for making the Ayurvedic medicines such as chavanprash, Trifla, Amla ki Rasayan and powder, which are good for the diabetic patients. Guava is a rich source of ascorbic acid and pectin. High quality nectar can be prepared from guava (Baramanry et al, 1951). Papaya is very wholesome fruit. Aykroyed (1995) ranks it second only to mango as a source of the precursor of vitamin A. They are used in preparation of jam, soft drinks, icecreams flavouring and crystallized fruits in syrup. At last, carrot is valued as food mainly because it is a rich source of α and β-carotene. Carrot roots are used as vegetable for soups, stews and used as salad. Carrot juice is a rich source of carotene and carrots are also canned.

In the present study honey was used as natural sweetener in place of white sugar for the preparation of various types of food products namely candy, murabba, squash, jam and toffee. Product wise recipes were finalized by determining optimal quantities of honey to be used. All the above named product were evaluated for various physico-chemical, microbial, textural (where ever required) and organoleptic characteristics in fresh (on 0th day of storage) as well as during six months storage at different intervals. For shelf life studies different packaging materials and storage conditions were used. Statistical and economic analysis was worked out for all above products separately to encourage small scale entrepreneurs. Based on the results obtained from this study the most suitable conclusions are presented product wise.

It was observed that very good quality carrot candy can be prepared by mixing 750g of honey per kg of carrot.

It was also observed that fresh honey carrot candy contains 28% moisture content, 72° Brix TSS, 0.064% acidity, 0.02 browning index, 30.5% reducing sugar, 78% total sugars, 16.27mg per 100g Beta carotene content.
The fresh carrot candy scored 8.33 on 9 point hedonic scale with respect to overall acceptability which decreased up to 6.83 and 6.79 respectively in glass jar and LDPE pouch during 180 days storage at ambient condition. This score corresponded to rated between ‘liked moderately’ to ‘liked slightly’.

Honey carrot candy was found at par in various organoleptic characteristics with carrot candy prepared in sugar and jaggery syrup.

In comparison to intermediate moisture (IM) carrot preserved, the honey carrot candy scored higher for organoleptic characteristics. Similarly in comparison to carrot milk cake the honey carrot candy was found to be at par with respect to organoleptic qualities.

Small scale industry can be established for production of honey carrot candy with production target 10kg/hr. The cost of production of honey carrot candy worked out to be Rs 52/kg. The annual net profit of Rs 2, 83,764 can be obtained with a return on investment 563% of the product is sold at the rate of Rs 75/kg.

It was observed that honey aonla murabba can be prepared by mixing honey and aonla in 1:1 ratio. The score for organoleptic characteristic for such product on 9 point hedonic scale were respectively 7.85 for colour, 8.05 for flavour, 7.95 for juiciness, 8.05 for texture and taste and 7.99 for overall acceptability.

It was also observed that the fresh honey aonla murabba contained 48.33% moisture content, 52.5°Brix TSS, 6.88% acidity, 0.037 browning index, 27.3% reducing sugars, 50.4% total sugar, 152.1mg/100g vitamin C.

The physico-chemical composition and microbial characteristics were respectively found to be decreasing and increasing during 180 days storage at ambient conditions when packed in glass jar and PET jars. However, with respect to microbial characteristics glass jar proved to be a better packaging material with TPC, Y & M count being in safe limits.

During 180 days storage no coliform count could be detected.

After 180 days storage the score for colour, flavour, juiciness, texture, taste and overall acceptability were respectively 7.15, 7.10, 7.77, 7.52, 6.98 and 7.31 in glass jar and between 7.37 to 6.75 for these characteristics in PET jar showing that the product was rated between liked moderately to liked slightly after 180 days of storage. However with respect to taste the product was rated between ‘liked very much’ to ‘liked moderately’.
In comparison to sugar syrup segments of aonla, the fresh honey aonla murabba had higher vitamin C content.

A small industry can be set up for production of honey aonla murabba with the investment of Rs 48,442. With a production target of about 18kg/hr, the cost of processing worked out to be Rs 45/kg and with a sell price of Rs 75/kg, the net annual profit works to be Rs 2,63,702 with return on investment of 545%.

It was observed that honey aonla squash can be prepared by mixing 60% of aonla juice and 40% of honey.

It was also observed that fresh honey aonla squash had 35.0°Brix TSS, 0.4% acidity, 0.08 browning index, 23.7% reducing sugar, 45.5% total sugar and 78.6% vitamin C content.

The scores for organoleptic characteristic for such product on 9 point hedonic scale were respectively 7.66 for colour, 7.66 for flavour, 8.66 for taste and 8.00 for overall acceptability. This score decreased gradually during 180 days storage. The overall acceptability scores remained 6.20 and 7.05 respectively at ambient and refrigerated temperatures. This score corresponded to rated between ‘liked moderately’ to ‘liked slightly’.

In comparison to aonla syrup the honey aonla squash has very high scores for all organoleptic characteristics. The ascorbic acid content is higher (78.6mg/100g) in honey aonla squash as compared to aonla squash (51.1 mg/100g) prepared with sugar.

The microbial counts were found to be increasing during 180 days of storage at room temperature and refrigerated temperature. However with respect to microbial characteristics refrigerated storage was better as compared to storage at room temperature with TPC, yeast and mould being in safe limits. No coli form count was detected during 180 days storage.

Small scale industry can be established for production of honey aonla squash with production target 10 lt/hr. A cost of production of honey carrot candy worked out to be Rs /lt. The annual net profit of Rs 2, 83,764 can be obtained with a return on investment of 563%.

It was observed that honey mixed fruit jam can be prepared by mixing 750 gm of honey per kg of mixed fruit pulp. The score for organoleptic characteristic for such product on 9
point hedonic scale were respectively 8.78 for colour, 8.06 for flavour, 7.63 for texture, 8.57 for taste and 8.26 for overall acceptability.

It was also observed that the fresh honey mixed fruit jam contained 48.33% moisture content, 52.5° Brix TSS, 6.88% acidity, 0.037 browning index, 27.3% reducing sugars, 50.4% total sugar, 152.1mg/100g vitamin C.

The microbial counts were found to be increasing during 180 days of storage at room temperature and refrigerated temperature. However with respect to microbial characteristics refrigerated storage was better as compared to storage at room temperature with TPC, yeast and mould being in safe limits. No coliform count was detected during 180 days storage.

Small scale industry can be established for production of honey mixed fruit jam with production target 10kg/hr. The cost of production of honey mixed fruit jam worked out to be Rs 77/kg. The annual net profit of Rs 2,7072 can be obtained with a return on investment 118% of the product is sold at the rate of Rs 105/kg.

It was observed that honey toffee can be prepared by mixing 400g milk powder, 120g hydrogenated fat/kg of honey.

It was also observed that fresh honey toffee contains 7.83% moisture content, 6.50 pH, 14.6% fat content, 0.25 browning index, 27.99% reducing sugar and 67.43% total sugar.

The fresh honey toffee scored 8.00 on 9 point hedonic scale with respect to overall acceptability which decreased up to 6.08 and 7.50 respectively at room temperature and refrigerated temperature during 180 days storage. This score corresponded to rated between 'liked moderately' to 'liked slightly'.

Honey toffee was found at par in various organoleptic characteristics with papaya toffees. The microbial characteristics were found to be increasing during 180 days of storage at room temperature and refrigerated temperature. However with respect to microbial characteristics refrigerated storage was better as compared to storage at room temperature with TPC, yeast and mould being in safe limits. No coliform count was detected during 180 days storage.

A small industry can be set up for production of honey toffee with the investment of Rs. 1,30,320 with a production target of 10kg/hr. The cost of processing works out to be Rs
108/kg and with a sell price of Rs 120/kg. The net annual profit of Rs 3,06,578 can be obtained with a return on investment of 227.5%.

Out of five different types of products developed in this study, Honey Carrot Candy, Honey Aonla Murabba, and Honey Toffee have found greater response from a large section of society who were served these products. Similar other products from other fruits and vegetables may be developed and evaluated.

The technologies developed in this project may be transferred to entrepreneurs for large and small scale adoptions particularly in rural areas.

Media needs to be informed about the potential use of honey in various foods. So that mass awareness of people can be created about the antimicrobial, antifungal, antioxidant and medicinal properties.

As the fruits and vegetables used in this study have therapeutic value and uses. The product developed by this study can be taken on clinical trail for combating various specific nutritional deficiencies.

The products developed in this study if properly incorporated, may lead to income generation to control poverty level and helps in overall National development.

Studies related to packaging of different products apart from method used in this study needs to be carried out in future.

Possibility of incorporation of honey in place of white sugar in development of other sweet products needs further R and D studies.