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Development and Nutritional Impact of Ready to Serve (RTS) Juice from Selected Edible Resources Including Indigenous Fruits and Vegetables of Indian Origin

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ABSTRACT

The aim of the research work is to formulate a nutritional juice to fulfil the nutritional requirements of human being through cost effective manner. Thus, the developmental strategy is to produce a nutritional health drink with natural preservatives as an alternative to chemically prepared modern soft drinks to avoid health risks and increase the bioavailability of fruits and vegetables derived nutritional fractionates. Selected fruits, vegetables and some spices including indigenous species of Indian origin were utilized in a proper proportion in order to attain the human nutritional requirements. The methodology includes the extraction of nutritional juice from fruits and vegetables and subsequent analysis of nutritive value. Hence, the nutritional content, percentage of antioxidants and antimicrobial activity were also assessed in order to fulfil the nutritional requirements and longevity of the juice without any chemical additives. Upon fulfilling the criteria of nutritional requirements, the palatability was tested with many volunteers to know their willingness of consumption and found that all had accepted it. In the modern world, many people are consuming juices, foods with chemical based production or preservation without knowing the actual deteriorative and negative side effects. But the consumption of natural nutritional juice kind of products, which are produced directly from natural resources, would certainly improve the health status of individual without any negative side effects. The result of this research study reveals the presence of large amount of antioxidants, which is significantly high (94.7%) and other nutritive factors such as vitamins, minerals, also proves the same.

Key words: Nutritional juice, fruits and vegetables, natural preservatives, immunity, antioxidants

INTRODUCTION

Consumption of fruits and vegetables led positive impacts on Immunological and Physiological basis were described with experimental studies in human beings (Lampe, 1999). Intake of vegetables and fruits, which contain carotenoids and other phytochemicals, helps in longevity and gives more health benefits (Li *et al.*, 2011). The juices from blended vegetables and fruits are much efficient as nutritional supplements rather than the whole vegetables. Number of experimental research in human as well as animal models provides an information about the stimulation of immunity upon the consumption of fruits and vegetable juices (Rowe *et al.*, 2011; Gerhauser, 2008; Bub *et al.*, 2003; Nantz *et al.*, 2006; Percival 2009).

Some experimental studies prove the importance and benefits of vegetables and fruits consumption to prevent several chronic diseases, particularly cardio vascular diseases (Hung *et al.*, 2004), besides another study also reveals the reduced incidence of cancer upon the consumption of vegetables or fruits rich in Anthocyanin kind of flavonoids (Wang and Stoner, 2008).

Another advantage of raw juice consumption is the bioavailability of essential minerals such as magnesium, potassium, calcium, selenium, and sodium etc. to human beings which support the better functioning of the parasympathetic part of the human autonomic nervous system to reduce the risk of myocardial dysfunction and vascular fibrosis, baro receptor dysfunction, damage of vascular system and arterial impairment (Barr *et al.*, 1995; Brilla *et al.*, 1990). In general intake of raw vegetable juice helps to tone up the nervous system.

The proposed natural juice is made from vegetables and fruits used in culinary preparations and blended with extract of some herbs such as root extract of *Hemidesmus indicus*, which is a natural preservative, a blood purifier and tonic. Along with this, the juice of *Emblica officinalis* (Indian Goosberry) and spice mix (pepper, clove, cinnamon and cardamom) extracts are also added, which act as a general tonic and natural preservative, respectively. Anti diabetic nature of *Emblica officinalis* (Nain *et al.*, 2012) is the main reason for the inclusion in the RTS juice. About 5.03% of this juice constitutes the extract of *Emblica officinalis* as mentioned in Table 1. The organoleptic property of the juice is enhanced with the addition of *Emblica officinalis* and spice mix along with honey and common salt. Fresh fruits and vegetables reduce the risk of diabetes type II due to low energy yield, less glycemic load, high content of micronutrients and fibre (Bazzano *et al.*, 2002; Ford and Mokdad, 2001). Notable research study on 332,905 persons of 8.8 years followup was concluded with inverse association of Type II diabetes with high consumption of fruits and vegetables according to the brief report from American Diabetes Association (Liu *et al.*, 2004). Several herbs, vegetables and fruits are selected in the health and wellness (RTS) drink. Freshly prepared juices are very good source of vitamins and minerals. Vitamins act as coenzyme, which activates enzymes upon binding and it leads to the activation several physiological reactions in human body system. Particularly, Vitamin C and Vitamin A act as antioxidant and prevents the formation of cancer (Ames, 1983). In the liquid phase of blood and other tissues, Vitamin C acts as free radical scavenger to a maximum extent (Rose and Bode, 1993). Further, human body can

Table 1: Ingredients of the RTS juice and its respective quantity with percentage (Spice mix includes equal proportion of pepper, clove, cinnamon and cardamom at an average of 0.2% each)

Ingredients	Quantity (g)	Percentage
<i>Lycopersicon esculentum</i> (Tomato)	750	15.08
<i>Musa paradisiaca</i> (Banana stem)	750	15.08
<i>Lagenaria siceraria</i> (Bottle Gourd)	500	10.05
<i>Cucumis sativus</i> (Cucumber)	500	10.05
<i>Trichosanthes anguina</i> (Snake Gourd)	500	10.05
<i>Luffa acutangula</i> (Ridge Gourd)	500	10.05
<i>Beta vulgaris</i> (Beet Root)	250	5.03
<i>Daucus carota</i> (Carrot)	250	5.03
<i>Phyllanthus emblica</i> (Amla)	250	5.03
<i>Hemidesmus indicus</i> (Indian Sarsaparilla)	12	0.24
<i>Citrus limonium</i> (Lemon)	300	6.03
<i>Citrus aurantium</i> (Orange)	150	3.02
Honey	200	4.02
Spice mix	40	0.80
Common salt	20	0.40

absorb more vitamins and minerals instantly if we drink juice rather than taking the whole vegetables and fruits. Crushing of vegetables to make juice will breakdown the fibres and release the trapped minerals. The mixed vegetable juice thus prepared contains the following vegetables: bottle gourd (*Lagenaria vulgaris*), snake gourd (*Trichosanthes cucumerina*), ridge gourd (*Luffa acutangula*), cucumber (*Cucumis sativa*), tomato (*Lycopersicon esculentum*), carrot (*Dacus carota*), beet root (*Beta vulgaris*), Indian gooseberry (*Emblica officinalis*), Orange (*Citrus aurantium*) and lemon (*Citrus limonium*) are added in desirable balanced quantities. Honey is also included in the preparation to enhance the taste and it may serve as a dietary antioxidants (Gheldof and Engeseth, 2002). In addition Indian Sarsaparilla (*Hemidesmus indicus*) root extract is also added to the juice as a natural preservative and it will also add flavour to the juice (Gopiesh and Kannabiran, 2007). They also report that the 100% larvicidal effect was achieved by 5% concentration of the aqueous root extract of *Hemidesmus indicus*, which strongly supports the utilization of this extract in the present beverage preparation. The root extract of *Hemidesmus indicus* has enormous fraction of antioxidants, particularly one of the major antioxidant compound called 2-hydroxy-4-methoxybenzaldehyde, which is responsible for the natural flavor of this extract as well (Chidambaramurthy *et al.*, 2006). *Hemidesmus indicus*, is used in Indian system of medicine to treat a variety of diseases and the syrup made from it is used in the preparation of herbal soft drinks due to its cooling properties. The main objective of this research study is to produce a vegetable and fruit based nutritional juice to alleviate several disorders without much calorie and any other chemical additives.

MATERIALS AND METHODS

Vegetables, fruits and other ingredients and their quantity used in the juice preparation are given in Table 1. Mineral content of the juice was analyzed using, Atomic Absorption Spectrophotometer (Solar S2 model) made in UK.

Extraction of juice: Vegetables, fruits and other ingredients in respective quantity and percentage is shown in Table 1. They were washed thoroughly in clean running water. Subsequently, transferred into tub-containing water with Gramicid (500 ppm), for surface sterilization. Then the vegetables and fruits were peeled off and sliced into small pieces under aseptic condition and kept at 4°C for 2 h prior to processing. The chillness of the vegetables will facilitate to retain the antioxidant property and minimizing the microbial contamination during processing. About 4700 g of vegetable mix was crushed in a semi automatic juice extractor for 5 min (Jay Aloe gel extractor-Model No: JHP 20020337, India). Then the raw juice was filtered through Nylon Mesh (pore size 120 µm) and about 4000 mL of clear juice was obtained. Later, other ingredients, such as honey (4%), spice mix (0.8%) and common salt (0.4%), an aqueous root extract of *Hemidesmus indicus* (0.24%) were added and the juice was diluted to 8000 mL with purified, boiled and cooled water. The pH was noted using pH meter and it was 6.8. The overall production and storage of this RTS juice schematic representation is shown in Fig. 1. The antioxidant property of the juice was analyzed by DPPH (2,2 -diphenyl-2-picryl-hydrazyl) method using Trolox as a standard (Koleva *et al.*, 2002).

RESULTS

The analysis of the nutrients in the juice shows the proportion of minerals micro and macronutrients seems to be suitable for beverage per serving (100 mL). The nutritional value of the juice is mentioned in Table 2. The juice was distributed to 100 volunteers to check its palatability and all accepted it.

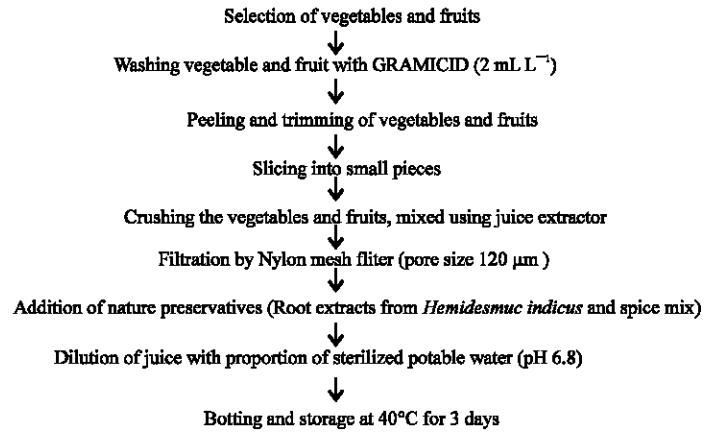


Fig. 1: Schematic representation of the RTS juice production and storage (Pilot plant study)

Table 2: Nutritional value of RTS juice

Parameter	Nutritive value
Energy 100 mL (Cal)	32
Total Carbohydrate (mg kg ⁻¹)	1.79
Total Protein (mg kg ⁻¹)	0.78
Fibre Content (%)	15.36
Total Fat (mg kg ⁻¹)	0.19
Vitamin C (μg kg ⁻¹)	689
Total Phosphorous (%)	0.29
Total Potassium (%)	2.58
Total Sodium (%)	0.89
Total Calcium (%)	1.58
Total Zinc (ppm)	0.89
Total Copper (ppm)	0.05
Total Iron (ppm)	18.69
Total Chromium (ppm)	0.03
Total Selenium (ppm)	0.02

Table 3: Energy value from each individual ingredients of vegetables, fruits and honey

Name of the vegetable/fruit	Cal 100 g
<i>Lycopersicon esculentum</i>	20
<i>Musa paradisiaca</i>	100
<i>Lagenaria siceraria</i>	10
<i>Cucumis sativus</i>	15
<i>Trichosanthes anguina</i>	20
<i>Luffa acutangula</i>	15
<i>Beta vulgaris</i>	45
<i>Daucus carota</i>	50
<i>Phyllanthus emblica</i>	60
<i>Citrus limonium</i>	55
<i>Citrus aurantium</i>	50
Honey	320

The calorific value of individual ingredients of the juice was estimated and the same was mentioned in Table 3.

DISCUSSION

The juice from vegetables is very useful for cancer patients; since many digestive systems in cancer patients are not functioning well and they have difficulty in digesting and assimilating the nutrients in raw vegetables, since they contain the pulp or crude fibres. But, when the pulp or crude fibres are removed, the nutrients can pass directly in to the blood stream and restoring the immune system. On the other hand, dietary fibre is very much essential to human beings and it can be obtained from plant edible products or its derivatives. A recent research study on dietary fibre, particularly soluble dietary fibre intake significantly lower the insulin resistance (Breneman and Tucker, 2012). The fibre content of major juices and soft drinks has been reported by USDA in the year of 2004 and it reveals the fibre content in soft drink is zero rather than other fruit juices, which contain at least some minimum amount (USDA, 2004). Also several research evidences strongly reveal the direct correlation between weight gain and soft drink consumption (Sweetman *et al.*, 2008; Malik *et al.*, 2006). Whereas the current research study of this RTS juice reveals the presence of 15.36% of fibre content as mentioned in Table 2. Besides, another newsletter from John Hopkins University, it is stated that the vegetables are valuable in maintaining alkaline reserve in the body (Ochiogrosso, 2008). The diet made of 80% of vegetables and juice, whole grains, seeds and nuts and little fruits help in keeping the body in an alkaline environment. This kind of environment is said to prevent human beings from degenerative diseases in general. It also prevents premature ageing of cells. The recent review strongly suggests the utilization of fruits, vegetables and spices for the preparation of nutrition health beverages due to the medicinal value and presence of large amount of vitamins, minerals, enzymes (Bhardwaj and Pandey, 2011). Further vegetable juices provide live enzymes that are easily absorbed and reach down to cellular level within 15 min to nourish and enhance growth of healthy cells. For this one has to drink fresh vegetable juice 2-3 times a day. This RTS juice preparation also serves the same purpose. In the preparation of raw vegetable juice about 67% of the vegetables are from gourds belonging to Cucurbitaceae family and are watery vegetables contain at least 80-95% water content. The most of the vegetables used for the juice preparation are frequently used in Indian culinary preparations. The pH of the juice was 6.8 and it is neutral, which is ideal for maintaining alkaline environment of the system to prevent several diseases. The juice is low in calories and ideal for people, who are obese and diabetic. The juice is also possesses good sources of vitamin C, minerals such as potassium, sodium, phosphorus, calcium, zinc etc as mentioned in Table 2. Among the cucurbits added in this RTS juice preparation, the cucumber contains enough macro elements, which help several metabolic processes such as bone formation (Abulude *et al.*, 2007) and digestion (due to the presence of an enzyme erepsin). Cucumber is a highly alkaline raw vegetable and good source of vitamin A and C. It is ideal for consuming to satisfy appetite, hence highly suitable for diabetic and obese patients. It is mainly added in this health drink juice, due to its diuretic properties and useful for people with urinary problem. It has cooling effect and the potassium in cucumber is useful for controlling blood pressure. The RTS juice is also a good source of potassium (2.58%) as mentioned in table due to its significant controlling effect on blood pressure and cardiovascular diseases. For instance, the recent research on Taiwan retired veteran volunteers were provided with K supplementation had proven the 41% reduction of the cardiovascular diseases (McDonough and Nguyen, 2012). The RTS juice gives an instant boost of nutrients, enzymes, vitamins and minerals, easy to digest and assimilate, adds many more vegetables in human daily diet. It also boosts the immune system and cleanses at cellular level (removal of toxin from the system), extremely alkaline to keep the human body free from disease, rich in natural medicines, prevents the premature

ageing of cells. The results of this nutrient drink analysis strongly reveal the presence of sufficient nutrient and minerals as mentioned in the above table. Macro and microelements such as Ca, K, Na, Mg, P, Cr, Fe, Zn, and Cu were found to be sufficient quantities in the juice with reference to the analytical validation as mentioned in Table 2. Further, this juice has to be validated for potentialities such as antidiabetic, antiulcer, antiobesity, anti alcoholism, cancer prevention, and for constipation etc.

Among gourds, snake gourd is a natural antibiotic, expectorant, laxative and tonic. Also the juice of snake gourd is useful in reducing bilious fever. Other gourd added in the juice is ridge gourd, which is demulcent, diuretic, and nutritive. It contains low saturated fatty acids and high in dietary fibre, vitamin C, riboflavin and other minerals. It has excellent cooling properties. Further, the bottle gourd is also blended with these three gourds. It is emetic, purgative, diuretic, and anti bilious. These cucurbits are cultivated as summer vegetable crops and their juices are good for human health. Banana is being widely used to prepare several kinds of juices, for instance a juice preparation from it by Yadav *et al.* (2010) suggests that it boosts energy. In this study, the stem of banana juice was incorporated in the beverage to increase energy and it is known for dissolving the kidney stone also. Though there was no scientific evidence for the occurrence of minerals, the energy rich banana pseudostem juice (100 calories) is effective in antilithiatic activity (Prasad *et al.*, 1993). Physicians from Kerala, Karnataka (India) in Ayurvedha suggesting the utility of banana to dissolve kidney stones (Pellai and Aashan, 1955). Besides, the reports by Bhaskar *et al.* (2011), indicate that banana flower and pseudostem are involved in minimizing the oxidative stress-induced tissue damage by regulating the altered antioxidant and lysosomal enzyme activities in different tissues during diabetes. These findings suggest that banana flower and pseudostem could be used as source of alternative medicines and nutraceuticals. Thus, about 15.08% of this RTS juice of consist of banana stem resource as a key ingredient due to its tremendous medicinal value as mentioned in Table 1.

A smaller quantity of beetroot blended with cucurbits and carrot etc. is rich in vitamins A, B, C, and E and minerals such as iron and manganese, phosphorous, potassium, silicon and sodium. The trace elements particularly Fe, Cu, Zn, and Se were found to be associated with several metabolic processes according to Malavolta *et al.* (2012). Accordingly the prepared RTS juice is also a potential source of these elements as it contains 18.69 ppm of Fe, 0.05 ppm of Cu, 0.89 ppm of Zn and 0.02 ppm of Se as mentioned in Table 2. The beet juice is very powerful and an excellent purifier and effective in cleaning liver, kidney and arteries. Beetroot juice consumption is effective in lowering blood pressure or hypertension due to the presence of nitrite, a potent vasodilator in human. Beets are rich in B Vitamin folate, which is essential for preventing some forms of anemia and also cancer preventive. It protects the cells' DNA from mutation. High potassium in it keeps the normal blood pressure according to the experimental proof conducted with beet root juice (Kapil *et al.*, 2010). Incorporation of beetroot in the juice, which contains considerable amount of nitrate helps to dilate and widen the blood vessels, there by reducing the blood pressure and allowing more blood flow and it can also be effective to boost the athlete's performance (Lansley *et al.*, 2011). Due to high amount of natural dietary fibres in the juice, this is helpful to diabetic and obese people. Carrot is one of the ingredients, which contains vitamins A, B, C, D, E and K and are particularly effective in preventing cataracts and other eye problems, cleansing, healing the body faster. Carrot juice boosts the immune system and protects against several diseases. For instance, it helps to rectify anaemia, circulatory problems and skin disorders. Also it is good for digestion and is an excellent remedy for ulcers, liver problem and asthma. It may help

to prevent tooth decay and gum diseases and it is a stamina booster, natural multivitamin, lowers blood pressure. Tomatoes are important source of lycopene and Vitamin C and it is valued for their color and flavor. Tomato is occupying second position in the world for its consumption after potato (Razdan and Matoo, 2007). It is the source for the prevention of radioactive damage in the skin and other body tissues. The juice of tomato contains vitamin A, B, C and E, minerals such as Iron, Phosphorous, Potassium, and Sulfur and is excellent for blood disorders and good tonic for nervous system. This is particularly beneficial for people, who suffer from anxiety, stress, nervousness, insomnia and fatigue. It has the ability to eliminate uric acid from the body and is an excellent food for people suffering from arthritis, gout and rheumatism. The lycopene content of tomato may play an essential role by contributing to antioxidative defends system of an organism, particularly after heat processing the activity is increased rather than unprocessed (Stahl and Sies, 1992). The tomato juice was prepared by heat treatment and mixed with this vegetable juice in order to increase lycopene activity which can lower the risks of some types of cancer including prostate cancer (Van Breemen *et al.*, 2002) and also on positive effects of curing cardiovascular diseases (Sesso *et al.*, 2005) similar to the effect of beet root juice. It is also diuretic and has excellent antimicrobial properties (Sung *et al.*, 2007), so externally if treated, can cure acne and skin infections. About 5% of Indian gooseberry was added in the juice. It known that the Indian gooseberry promotes food absorption and boosts immunity and rejuvenates the body, it also promotes fertility and memory and is a helpful herb for diabetes. It is a powerful skin and hair rejuvenator and is an eye and liver toner. It restores stomach and intestinal digestive enzymes and strengthens the function of heart and lungs; it reduces body heat and weight naturally. Indian gooseberry being rich in Vitamin C has been considered as a good antioxidant. The presence of trace amount of chromium in it is of therapeutic value in diabetes. It is also laxative and diuretic. Indian gooseberry also fights against many infectious diseases including viral diseases. For instance, a polyphenolic compound called 1,2,4,6-tetra-O-galloyl- β -D-glucose was found to possess potential anti-HBV activity (Xiang *et al.*, 2010). Lemon in combination with honey in the juice can be a remedy for common cold, tonsillitis, digestive disorder, constipation and scurvy. Lemon has sedative effect on nerves. Fresh lime and honey in the juice can be helpful in reduction of obesity. Like lemon orange is also rich in vitamin C. Addition of orange in the juice helps to boosts up the immune system (Grimble, 1997) and reducing the risk of Alzheimer disease (Engelhart *et al.*, 2002). There are several reports in the preservation of vegetable juice using herbs (Majumdar *et al.*, 2011). In this study Indian Sarsaparilla root extract, a natural herb helps in increasing the shelf life of this RTS juice up to one week at 4°C. Recent research study revealed that the herbal spice based preservatives can be used as an alternative to chemical based food preservatives (Chattopadhyay and Bhattacharyya, 2007). *Hemidesmus indicus* is a valuable medicinal plant and posses a lot of medicinal properties, such as being an, antimicrobial (Das and Deveraj, 2006) astringent and antipyretic and tonic (Gayathri and Kannabiran, 2009). So, the addition of spice mix and herb (root extract of *Hemidesmus indicus*) in this juice also proves the same.

Assessment of microbial load in juice: The juice was also subjected for the assessment of microbial load. The analysis reveals the absence of yeast colonies and other pathogenic bacteria such as *Shigella* sp and *Salmonella* sp according to the reports by microbiology department. This may be due to the addition of spice mix (0.80% as mentioned in Table 1), especially cinnamon, which act as a natural preservative to arrest the microbes especially yeast. The extract of *Hemidesmus indicus* considered as traditional natural preservative and may prevent the growth

of pathogenic microbes to a maximum extent. Upon the addition of extract of *Hemidesmus indicus* (0.24% as mentioned in Table 1), we found the preservation of juice without pathogenic microbes. In addition, juice extracted from other vegetables also exhibited antimicrobial activity, which may retain the juice fresh without microbial population. But addition of chemical preservatives such as Sodium Benzoate/Potassium sorbate and Citric acid extends the shelf life of the juice. Addition of spice mix at about 1% level showed an effective antimicrobial property apart from the extract of *Hemidesmus indicus*, honey and other vegetables and fruits, which also have some antimicrobial properties. The addition of spice mix in the juice, especially cinnamon is seems to prevent the occurrence of *E. coli* as it has been reported by Ceylan *et al.* (1999).

Antioxidant activity by DPPH method: The juice preparation is rich in antioxidants and it has been experimentally proved. The anti oxidant property of the prepared RTS juice was analyzed at the absorbance of 517 nm using DPPH as a control. The absorbance value of the DPPH control and RTS juice was 0.419 and 0.022, respectively at 517 nm. The result clearly indicates the presence of antioxidant activity to the extent of 94.74% of antioxidant activity in the prepared RTS juice, which is significantly high. Recent evidences implicate that the higher amount of consumption of plant-derived foods with variety of phytochemicals are reducing the risks of cancers occurring in the various organs of the human body. Particularly, the phenolic compounds, enhancing the immune system to recognize the tumor growth and this prevents the tumor angiogenesis by arresting the vascularization towards tumor (Wahle *et al.*, 2010). Free radicals are presumably the major cause of oxidative stress and cell damage leads to several degenerative disorders such as cancer, cardiovascular disease, cataracts, dysfunction of brain and declining immune system (Sies *et al.*, 1992). Accordingly, it was suggested that the administration of Phytochemicals with high antioxidant potential could decrease the toxic effect of chemotherapy and reduces the risk of heart failure (Piasek *et al.*, 2009). The inclusion of banana pseudostem juice in this study (15%) is reported to contain more phenolic compounds, which act as effective antioxidants (Saravanan and Aradhya, 2011). Addition of Indian gooseberry juice and aqueous extract of *Hemidesmus indicus* also act as effective antioxidants, since Indian gooseberry being the rich source of ascorbic acid (Khopde *et al.*, 2001). With the above juice, honey is added at about 4% level, which contains several antioxidants, one of them is pinocembrin a flavonoid, which is found only in honey (Bogdanov, 1989). However the low pH and osmolarity is responsible for antibacterial activity (Yatsunami and Echigo, 1984). According to the antioxidant assay, it is found the presence of 94.74% of antioxidant activity in the RTS juice prepared. Due to this fact, it is much potent juice against various kinds of diseases including cancer.

CONCLUSION

The laboratory analysis of this RTS juice preparation strongly indicates the presence of enormous nutritional factors, would be adequate for the human nutritional requirements. Hence, the plant derived nutritional sources are potent enough to prevent and alleviate the occurrence of major metabolic disorders and infectious diseases as well. The traditional resources are being disappeared in modern era due to lack of awareness about the valuable medicinal properties in plant derived products. According to Hippocrates "Let food be thy medicine and medicine be thy food" and also sage of Indian ancient medicine called "Thirumoolar" emphasized the same principle. Thus, the motto of this research study is to prepare a juice, completely from plant derived products to possibly prevent and alleviate the diseases at maximum extent. In order to understand further,

it is essential to analyze this juice through laboratory animal tests and animal cell cultures. Thence, the concluding remark of this research study reveals the juice or food products prepared from edible and palatable plant resources without any chemical preservatives and chemically derived additives can be used as a potent nutritional promoter.

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