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TECHNICAL SESSION – I

PUBLIC HEALTH NUTRITION (PHN)

PHN-O-01

IMPACT OF FOOD AND NUTRITION PROGRAMME ON WOMEN AND CHILDREN'S HEALTH: A STUDY IN CHITTOOR DISTRICT OF ANDHRA PRADESH

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The Health and Nutrition programme is one of the units in Society for Elimination of Rural Poverty (SERP) is managing implementation of a comprehensive community-based Health and Nutrition Programme in rural Andhra Pradesh under the Indira Kranthi Patham (IKP) program for women development. The major revolving theme around IKP's interventions is fostering community management of these activities to ensure that sustainability is maintained even after the project ends. Health and nutrition are two of the greatest barriers to overcoming poverty in rural areas of Chittoor District. Young girls often enter their reproductive years in an undernourished condition and a staggering 75 percent of them are facing anemic. National nutritional surveys show that the majority (60-80 percent) of India's poor, socio-economically marginalized populations have a 20- 40 percent shortfall in their protein-energy intake. This is even greater for pregnant and lactating women and young children. Almost one third of all babies in India are born with low birth weights, half of the children 5 are chronically malnourished, and over 40 percent are stunted. Malnourished children are more susceptible to disease, have a reduced capacity to learn, and are much more likely to drop out of school. Currently the programme providing supplementary nutrition to pregnant and lactating women and their children meet with limited success. The present study evaluates the Health and nutritional activists at village level, awareness and practices on breast feeding, child care, ante natal and post natal care and personal hygiene etc.

PHN-O-02

THE IMPACT OF BREAKFAST ON ACADEMIC, PHYSICAL AND COGNITIVE FUNCTIONS OF CHILDREN AND ADOLESCENTS: A REVIEW

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Breakfast is widely acknowledged as the most important meal of the day and unhealthy lifestyle and eating habits among adolescents is a major health concern.

Studies have indicated a negative association between lifestyle habits and decreased cognitive function and academic achievement, stating that skipping breakfast had a negative impact on academic achievement affecting cognition and absenteeism in adolescents and the intake of a healthy breakfast is associated with an improved cognitive function and academic achievement. Those who habitually consume breakfast are more likely to have favorable nutritional status including dietary fiber, total carbohydrate and lower total fat and cholesterol. Micronutrients like Iron, B vitamins (folate, thiamine, riboflavin, niacin, B₆, and B₁₂) and Vitamin D are 20- 60% higher in those who regularly eat breakfast compared to breakfast skippers. Habitual consumption of breakfast maintains BMI within the normal range and reduce likelihood of being overweight. Skipping breakfast causes low physical activity and cardio respiratory fitness level, and is demonstrable in undernourished children, one standard deviation below normal height or weight for age using the US National Center for Health Statistics (NCHS) reference. Recent evidence compares breakfast meals that differ in Glycemic Index and suggested that a lower postprandial glycemic response is beneficial to cognitive performance. High academic score was positively associated with positive nutrition behaviors such as fruit consumption and less 100% fruit juice or sweetened beverages. Key words: breakfast, cognition, academic performance, lifestyle, obesity

PHN-O-03

OBESITY AND ITS IMPACT ON HEALTH STATUS OF ADULT WOMEN OF BEED DISTRICT

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Over weight and obesity are a complex health problem, that affects more than two thirds of adults. There are many health conditions associated with overweight & obesity including hypertension, coronary heart disease and type 2 diabetes. A study result concluded that high prevalence of overweight or obesity is associated with chronic diseases. For the present study three hundred adult women in the age of 25 to 45 years were selected from rural and urban areas of Beed district. The study result revealed that maximum number of adult women were having hypertension (high blood pressure) problem. It may be due to high intake of fatty and salty imbalanced foods, low physical activities, Lack of exercise etc. 42% of urban and 58% of rural sample have health problems like cardiovascular, diabetes, asthma etc. It is concluded that incidence of hypertension in adult women cannot be related to any single attribute to diet but it is an integration of dietary & other environmental factors also. Key words: Obesity, hypertension, health, status.

PHN-O-04

METALLOTHERAPY: AN APPROACH TOWARDS RESOLVING PROBLEM OF ANTIBIOTIC RESISTANCE DEVELOPED IN CURRENT SYSTEM OF MEDICATION

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A specific level of concentration of each kind of cellular metal is essential for regulating requisite level of body fluids pH. A significant change in concentration level of a cellular metal adversely affect pH level of a cell and render it prone to invasion of infection. Nature of effective infection depends not only on chemical nature of cellular metal but also on its level of deficiency. Infectious diseases are generally managed by antibiotic treatment. The emerged trend of drug resistant attitude in infection against antibiotics posed a serious threat for treatment of certain health problems. An innovative way for resolving such diseases is based on “concentration related curative potential” of a cellular metal that states (i) Clinical management of a disease requires restoration of normalcy in concentrations of deficient cellular metal/metals through oral administration of their suitable salt. (ii) Rising concentration of administered metal (salt) during treatment modifies profile of physiological environment through change in level of body fluids pH that at particular level threaten survival of localized infection and cures it. (iii) At normal concentration administered metal restores normalcy in degraded levels of physiological functions that simultaneously stimulates self-healing process for health recovery. Nature of deficient cellular metals are identified by conducting elemental analysis of biopsy material (scalp hair/blood serum) that may be collected on random basis using a suitable analytical technique. Metallic salts for clinical use may be prepared by vapour-phase reaction between metal oxide and ammonium chloride. After *in vitro* study, metallic salt helps in resolving health problems that are associated with various levels of deficiencies of the metal in animal body. Keyword: Metallo-therapy.

PHN-O-05

ASSOCIATION OF PHYSICAL ACTIVITY, NUTRIENT INTAKE AND ANTHROPOMETRY IN ADOLESCENT GIRLS

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The health of adolescent girls has attracted global attention in past two decades. Determination of nutritional status of adolescence girls is very important as it plays vital role in maintaining good health and is the time to learn and adopt healthy habits to avoid many health and nutritional problems later in life. A cross-sectional study was carried out on a sample of 300 college going adolescent girls in the age group of 17-19 years. The study

aimed at finding out association of physical activity with dietary intake and anthropometric parameters of adolescent girls. Findings of the study revealed that majority of the girls were underweight with BMI <18.5(66%). About 50% girls were found to be sedentary active. Deficient Protein (9.1↓ %) and energy intake (41.9↓ %) was seen when intake of these nutrients was compared to recommended dietary allowances (RDA) prescribed by ICMR. A insignificant association was seen in MUAC of among vigorously active, moderately active and sedentary active adolescent girls whereas summary of one way ANOVA of final scores of BMI and W/H ratio, as well as protein and energy intake among vigorously active, moderately active and sedentary active adolescent girls indicated a significant association ($p < 0.05$). This significant association reveals that activity has strong influence and plays a vital role in deciding the basal metabolic rate as well as affects protein and energy intake of the adolescent girls. Keywords: Adolescent girls, anthropometry, nutrient intake, physical activity

PHN-O-06

PREVALENCE OF AUTISM AMONG SELECTED CHILDREN

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Autism was delineate as a “pervasive developmental disorder” characterized by severe impairment in several areas of development such as social interaction, communication and imagination. Autism is also defined as a polygenetic developmental neurobiologic disorder with multiorgan system involvement, though it predominantly involves central nervous system dysfunction. This disorder has a broad impact on cognitive and neurologic functioning. The present study evaluated the severity of autism among three different special schools. One hundred and eighty autistic children of three different special schools were administered Indian Scale for Assessment of Autism. It was found that 81% of autistic children were found as in mild autism, 9% of autistic children were found as in moderate autism and 10% of autistic children were found as in severe autism. Among three different special schools the children with mild autism were in higher population.

PHN-P-01

SIMPLE STEPS FOR PREVENTING DIABETES

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Diabetes is a major public health problem that is approaching epidemic proportions globally. There is an urgent need for strategies to curb the rising prevalence of this disease, and prevention appears a logical approach. Lifestyle modifications with weight loss and moderate

exercise can reduce the incidence of diabetes by >50% in patients with impaired glucose tolerance (IGT). The use of metformin, acarbose and other agents have been shown in randomized prospective trials to prevent type 2 diabetes in high-risk subjects with IGT. Other pharmacological interventions are currently being examined in large prospective studies. It is likely that one or a combination of these approaches could make diabetes prevention a reality in the near future. Key for preventing type 2 diabetes can be boiled down to five words: Stay lean and stay active.

PHN-P-02

DIET, LIFESTYLE AND THE RISK OF OBESITY AND DIABETES

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Highly lightened topic at international level is increased obesity related disorders like diabetes in most of the population across the world. Food habits like smoking and alcoholism are common reason in most of the adolescents. The working and living pattern of people is computerized and atomized culture due to which fewer calories are utilized as compared to intake of food. Mainly changing food habits, preference to junk foods are responsible factor for obesity, high blood pressure and cardiovascular disease. Increasing in weight directly leads to sure chance of diabetes which is significant cause of death. Such diseases results in loss of working efficiency, loss of working hours and family income of person due to poor health. To avoid such a big loss of national income and additional financial burden on family, to prevent such diseases one has to think for preventive measures. For this more Physical activity, balanced diet, and awareness of weight maintenance must be taken as social responsibility as optimal health of population is asset of nation. This paper provides an overview on noncontagious diseases, especially risk of obesity and diabetes and preventive measures through diet and living habits. *Keywords:* Obesity, Diabetes, junk food.

PHN-P-03

EFFECT OF HEALTHY DIET FOR IMPROVEMENT OF PUBLIC HEALTH

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Public health is of huge concern to people belonging from all strata as it is prerequisite for healthy population. Balanced diet is essential throughout the stages of life to remain healthy. There is an utmost requirement of healthy wholesome food which will provide all the essential component of nutrition for maintaining proper health at low price. Apart from this, awareness about the relation between diet and diseases is important for improving public health. Yet there are lifestyle related risk

factors which invite most diseases to those sections of population who are heavily relied on junk food. Changing food habits of people from house hold traditional whole some fresh food to high fat, sugar, and salt containing fast-food is the major reason for poor gut health across the country. Especially prebiotic food with the presence of probiotic is an alternative for improving gut health. Processed foods with chemical additives such as preservatives, color, flavoring compounds used to make food attractive should be avoided as many times these makes food deficient in balanced, sufficient and good nutrients. However improvement in the health covers many aspects but consumption of functional food in daily diet found preventive for many non-communicable diseases and will help in improving health.

Keyword: Public health, balanced diet, disease, functional food, Pribiotic.

PHN-P-04

EATING HABITS AMONG UNIVERSITY STUDENTS

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Eating habits is the way a person eats, considered in terms of what types of food are eaten, in what quantities and when. Various factors which influence people's eating habits such as individual, social, cultural, environment etc. Eating habits are major determinant of health status among the people. The study reported that there is significant higher percentage of men than women eating fast foods at least once weekly and are more likely to pile on large portions of food or not considering portion sizes, eat French fries, burger and indulge in sugary and salty snacks to fuel late night sessions whereas larger percentage of women consider small portion size when ordering, choose healthier options at fast food restaurants as well as gave eating with family/friends as 1 of 2 main reason for eating at fast-food restaurants (Judy A et.al,2006). Therefore, differences were observed by sex in the eating behaviours of college students and hence, we found that women's are more concern about their weight, eating pattern as compared to men. Another study suggested that male students consumed a higher energy content from fat, a large amount of fibre, more fruits and vegetables and engaged less often in various healthful eating habits (eg:- reading food labels, having breakfast) than female students (Rebecca Y et.al,2011). One more study by (Gan WY et.al, 2011) showed that more than half of the students did not meet the Recommended Nutrient Intake (RNI) for energy, vitamin C, thiamine, riboflavin, niacin, iron and calcium. However more males than females achieved the RNI levels for energy, protein and iron intakes. This study highlights the presence of inadequate nutrient intake among the students. Therefore, promoting healthy eating among students is crucial to achieve a healthy nutritional status.

PHN-P-05

WEANING PRACTICES OF UNDER-FIVE CHILDREN IN URBAN AREAS OF ALLAHABAD DISTRICT

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In developing countries like India child health is of serious concern as the prevalence of malnutrition among children continues to be high (46%). Since weaning prevailing in the community play a crucial role in deciding the health of a child. The present research was conducted to study the attitudes, beliefs and behavior regarding weaning practices; and the influence of various epidemiological factors on these practices in children of 0-5 years of age group. A pretested questionnaire was developed to assess the knowledge, attitude and practices regarding the weaning. Appropriate statistical technique was adopted for the analysis. A total of 171 mother-child pairs were taken for the study. The mean age of mothers was 23.5±3.9. Breastfeeding was being done by 167 (97.66%) of the mothers. Almost 13.45% of the mothers started complementary feeding before the recommended age of 6 months and 47.36% delayed introduction of complementary feeding beyond the recommended age. Breast feeding practices adopted by mothers of urban area are still lacking in terms of late initiation of and early starting of complementary feeding. There is a need to educate the mothers regarding proper infant feeding practices.

PHN-P-06

EVALUATION STUDY ON MID DAY MEAL PROGRAMME IN BARAMULLA DISTRICT

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Under nutrition among children is a major public health problem of developing countries like India. Thus improved child health & survivals are among the prime objectives of India's population policy. The objective of the present study was to assess the impact of the Mid Day Meals on nutritional status of the school going children 6 – 11 years of district Baramulla Jammu & Kashmir. A total number 234 school children (145 from Mid Day Meals Schools and 89 from Non Mid Day Meals Schools) aged 6- 11 years were included in this cross sectional study. The weight and height were recorded for each pupil and converted to nutritional indices. The study revealed that 83 percent of the beneficiaries of the Mid Day Meals are under weight and among them 10 percent had one or other signs of micronutrient deficiencies. So the possible effects of the Mid Day Meals on nutritional status of the school children are very less. The administrative, managerial and financial factors affected the scheme's effectiveness in the

studied area. The Mid Day Meals Program needs to strengthen in its operational supervision. Also the quantity and quality of the supplement needs to be further improved to fill the nutrient gaps.

PHN-P-07

A NUTRITION STATUS OF PACKED LUNCH OF SCHOOL CHILDREN (4-6 years) IN AJMER CITY

Neha Jain

The study was undertaken to assess Nutrition status of School Children (4-6 Years) of "Sanskrit school" and "east point school" in Ajmer City. A sample of One Twenty 4 to 6 Year children was selected by convenience sampling sixty children were selected by random sampling by each School. Assessment was done regarding anthropometric measurement, dietary survey by Three Days observation method of the lunch provided or the lunch boxes bought to the school, clinical examination for sign and symptoms of any nutrient deficiencies. Dietary intake showed that children of all age group mean was Energy(208.6 kcal., 143 kcal.,), carbohydrate(34.73 gm, 22.73gm), protein (8.53 gm, 5 gm) , Iron (1.95 mg., 2 mg.) calcium (38.38 mg, 22.48 mg.) and Vitamin C (5.38 mg., 9 mg.) Intake were compare to RDA's. Anthropometric measurements were not significantly different when pre - schoolers of the two group were compared to Gomez classification and Vishweshver Rao's classification . Hence in Conclusion, the study highlighted the fact that there is a definite relationship of Dietary intake from Provided Lunch of Sanskriti School and Packed Lunch of East point school children's. It also depends on that The Sanskriti School provides Lunch by itself and East Point School Students lunch provided by their parents which is depends upon the other factor of family like living standard, Income of parents etc. The present study revealed that Dietary intake of Sanskriti School children's is better as compare to Children of East Point School.

TECHNICAL SESSION -II

**FOOD PROCESSING AND
TECHNOLOGY (FPT)**

FPT-O-01

**NUTRIENT COMPOSITION AND SENSORY
EVALUATION OF VALUE ADDED *DHOKLA*
PREPARED BY INCORPORATING GREEN
BEANS POWDER**

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Four types of green beans viz. cluster bean, cowpea bean, french bean and sem bean were used in the present investigation. All the beans were dried, made into fine powder and supplemented at 5 percent and 10 per cent level in the preparation of *dhokla*. The *dhokla* prepared without using beans powder served as control. The organoleptic evaluation showed that *dhokla* prepared incorporating five per cent beans powder were more acceptable as compared to the one containing ten per cent beans powder. The nutritional analysis revealed that the protein content of control *dhokla* was 15.60 per cent which increased significantly upto 17.21 per cent with incorporation of fresh beans powder. The crude fiber and ash content in *dhokla* supplemented with green beans had increased significantly as compared to control *dhokla*. Total dietary fiber content ranged from 18.75 to 19.64 per cent in supplemented *dhokla* whereas control *dhokla* contained 17.60 per cent total dietary fiber. The results of the study indicated that calcium content ranged from 58.71 to 62.67 mg/100g in supplemented *dhokla*, whereas control *dhokla* had 57.11mg/100g calcium. Sem bean *dhokla* contained the highest phosphorus (297.07 mg/100g) while cowpea bean had the lowest (293.99 mg/100g) phosphorus content. The addition of the fresh beans powder to *dhokla* improved iron, manganese, zinc and magnesium content significantly. Total potassium content was the highest in french bean *dhokla* (610.73 mg/100g) followed by cluster bean *dhokla* (603.16 mg/100g), sem bean *dhokla* (591.40 mg/100g) and cowpea bean *dhokla* (583.11mg /100g).

FPT-O-02

**NUTRITIONALLY AND FUNCTIONALLY
RICH FOOD PRODUCTS WITH SPROUTED
LEGUMES AND MALTED MILLETS AND
FRUITS/VEGETABLES**

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A healthy food is well balanced with respect to quality and quantity of ingredients from different food groups and not just concentrating on one food group,

giving rise to the concept of multi-grain foods. Owing to the present demand there is a need to develop convenient yet healthy multi-grain food products. Novel products like instant porridge, biscuits, nutri-bar and extruded snacks were formulated being rich in carbohydrates, proteins, minerals and functional components using ingredients from every food group (cereals, millets, pulses, oilseeds, dairy and papaya/spinach) including sprouted green gram, soybean and malted finger millet and sweetened with natural sweeteners like honey and jaggery (for nutri bars) . Porridge and nutri-bar were optimized using Response surface methodology. The sensory tests for nutri-bar were carried out using fuzzy logic. All the products were tested for nutritional (fat, protein, minerals) and functional (phenolics, anti-oxidants and radical scavenging activity), textural and rheological properties and were found to be significantly superior to conventional products. None of the products included refined flour, butter/margarine or any artificial flavours, colour or additives. All the products were tested by carrying out nutritional trials in the villages in Bhopal district and were found to improve the nutritional status of school going children along with being popular among them.

FPT-O-03

**EFFECT OF HYDROCOLLOIDS
COATING ON THE QUALITY ATTRIBUTES
OF TARO CHIPS**

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Hathan**

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The aim of this study was to see the effect of different hydrocolloids coating of taro slices on the oil absorption during frying. Taro slices of thickness 1.5mm were blanched in 0.5% CaCl₂ at 80°C for 5 minutes followed by dipping in aqueous solution of hydrocolloids (pectin, guar gum and methyl cellulose) having concentration from 0.5-1.5%. The chips were fried in refined sunflower oil at 170°C for 3 min. The chips were analyzed for various quality attributes. Methyl cellulose coating with 1.5% concentration resulted in better quality chips as compared to pectin and guar gum coating having highest potential to reduce the oil absorption and better sensory quality.

FPT-O-04

**SOYBEAN FOR HOUSEHOLD NUTRITIONAL
SECURITY AT AN AFFORDABLE COST**

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Human beings, the highest form of life on the planet earth and scientifically the most advanced species, have a strong desire to live longer and are always in search of an appropriate diet and medicine that can help them to

live healthier, happier and longer. In this context, soyfortified diet is one of the best options and least expensive. Soybean is a grain legume and provides high quality nutrition, nutraceuticals and therapeutic ingredients that help people to live with an enhanced quality of life. The unique chemical composition of soybean, which consists of about 40% good quality protein, at par with animal protein, 20% oil and a number of bioactive compounds, such as isoflavones, tocopherol and lecithin, has made it one of the most valuable crops of the world. Food derived from soybean provides, both, specific and general health benefits and being an economical source of high quality nutrition & phytochemicals, soybean has a potential to alleviate large-scale protein-calorie malnutrition, prevailing in the poorer section of the Indian society and other Afro-Asian countries. A direct food use of soybean is more nutritious and economical. In fact, soyfortified diet suits to the richest of the rich on health grounds and to the poorest of the poor on economic considerations. The cost of one kilogramme of protein from whole soybean in the form of fullfat soyflour is Rs 150 only whereas it is Rs 300 from pulses, Rs. 480 from eggs, Rs. 1000 from milk, Rs 1020 from chicken, Rs. 1080 from fish and Rs 1800 from mutton. There are no side effects from eating plant proteins like soybean whereas considerable risks are associated with livestock based diets. The paper describes as to how to process soybean for food uses at domestic & commercial scales using appropriate latest technology and derive health and economic benefits from eating soy fortified diets.

FPT-O-05

QUALITY IMPROVEMENT & SENSORY EVALUATION OF SOYA MILK PREPARED BY GERMINATED SOYBEANS

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This study focused on improving and diversifying the food and nutrition status of soy milk prepared by germinating the soybeans prior to soy milk preparation and evaluating its quality and potential for acceptance. The pH, moisture, fat, protein, ash and total solid content of raw material soybean were 6.76, 12, 17.67, 39.6, 5.3, and 88 %. Non-Germinated and Germinated Soy milk (from short- time Soybeans (28 hours)) was produced. Soya Milk samples were analyzed for protein, moisture, ash, pH, total solids, carbohydrates, fat, total phenolic content and sensory attributes. The pH, moisture, protein, fat, ash, carbohydrate and total solid contents of germinated soy milk were 6.85, 95, 3.11, 1.28, 0.56, 0.50 and 5 % respectively while those of non- germinated soymilk were 7.05, 93, 2.64, 1.50, 0.65, 2.21 and 7 %, respectively. From the results, comparing the germinated and non-germinated soybean, the total phenolics content was decreased significantly from 13.76 ± 0.294 to 10.67 ± 0.434 after germination. The germinated soy milk was liked much by the people as per its taste, colour, texture, flavor and mean score for all attributes as per overall acceptability was 7.46 out of 10. Soy milk made under 28

hours germination conditions imparts great nutritional value as germination increases protein digestibility and decreases fat, carbohydrate, ash, total solids, pH and Anti-nutrient like total phenolic content. Thus, Soy Milk developed by incorporating short time germination of soybeans have enhanced functional attributes and improved the food quality. Key words: Soybean, Germination, Phenolic compounds, Organoleptic.

FPT-O-06

EFFECT OF EXTRACTION PARAMETERS ON TOTAL PHENOL CONTENT AND RADICAL SCAVENGING ACTIVITY OF ORANGE PEEL POWDER EXTRACT

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The effect of ethanol-sample ratio, temperature and time on total phenol content (TPC) and DPPH radical scavenging activity (RSA) of orange peel powder extract (OPPE) was investigated. Response Surface Methodology (RSM) was used to optimize the extraction parameters. Linear model for TPC and quadratic model for DPPH RSA data of the OPPE were fitted well to the second order polynomial model. The results revealed that ethanol-sample ratio and extraction temperature had a highly significant effect ($p < 0.05$) on the change in TPC while DPPH RSA was significantly changed ($P < 0.05$) by extraction time, extraction temperature and ethanol-sample ratio in the descending order. The highest TPC and DPPH radical scavenging activity were found to be at extraction time of 12 h, extraction temperature of 40 °C and ethanol-sample ratio of 10:1 (mL/g). The optimal extraction parameters of orange peel extracts for highest values of TPC (98.1707 mg of CAE/g) and DPPH RSA (93.2715 % inhibition) were found to be ethanol-sample ratio of 10:1 (mL/g), extraction temperature of 30 °C and extraction time of 6 h, indicating the excess of solvent (>10 mL/g sample), time (>6 h) and temperature (>30 °C) were not efficient for the extraction process for orange peel powder.

FPT-O-07

PHYSIO-CHEMICAL AND BIO-FUNCTIONAL PROPERTIES OF READY-TO-SERVE (RTS) HERBAL ALOE VERA DRINK

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Biomolecules present in aloe vera extracts have encouraged researchers to use these as a functional ingredients for formulation of functional or nutraceuticals foods. The present study was designed to study the various functional attributes of formulated a ready-to-serve (RTS) drink consisting herbs like tulsi and mint along with some

seasonal fruit (orange, kiwi). Design expert software was used for best optimized combination for of juice. Cytotoxicity and proximate analysis of locally available aloe vera plant gel were done. The best combination was obtained as orange: 72.6%; aloe vera: 14.628%; kiwi: 14.278%; tulsi: 6.640% and Mint: 4.523% showing highest DPPH and total phenolic content of 100.174 and 76.025µgGAE/ml respectively. The aloe vera juice showed maximum activity against *Salmonella typhimurium* and *Bacillus subtilis* with a zone of 10±1 mm and against fungus *Candida albicans* with a zone of 14±0.5mm. The EDX analysis showed the presence of Potassium: 0.51, Calcium: 0.46 Zinc: 0.12% by weight as micronutrients in the formulated product. The energy value of formulated optimized juice was 94.2 kcal/100g. The product also showed acceptable storage stability. Thus, the formulated juice and can be served as a ready to serve energy drink with health beneficial effect.

FPT-O-08

DESIGN THE SNACKS PRODUCTS BY USING PEARL MILLET AND ITS ACCEPTABILITY EVALUATION

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Bajra (*PennisetumTryphodium*) is an important millet crop and considered to be a poor people food. It is high in protein as compared to other cereals and all essential amino acids particularly high in lysine, methionine and cysteine. It is also rich in minerals and vitamins. It is beneficial for several non-communicable diseases such as diabetes and heart diseases. The study was carried out for the development of snacks products by using bajra flour and also studied its sensory evaluation. Chakli, Sev, Pakoda, Usal and Dhapata snacks products were developed. From all the developed products sev got the highest overall acceptability score (8.8) followed by Chakli (8.7), Usal, Dhapata (8.4) and Pakoda (8.3). Bajra flour improves taste and texture of the developed products. The result of calculated nutritional evaluation revealed that all products of bajra has good nutritional composition and high in protein calcium and iron content. On the whole it can be concluded that bajra flour can be successfully utilized in the preparation of nutritious food products.

FPT-O-09

UTILIZATION OF BROWN RICE FOR PRODUCT DEVELOPMENT

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Brown rice is a whole grain cereal produced by removing only the hull or husk using mortar-and-pestle or

rubber roller (dehuller) milling machine. It is known as *pinawa* in Pilipino but labeled either as brown, unmilled, or unpolished rice. The bran layer that is not removed gives the grain its brown color and retains its high levels of soluble fiber, antioxidants, and other vitamins and minerals. When the bran is removed, it becomes well-milled or white rice. The experiment was conducted in the Research laboratory of Foods and Nutrition, Ethelind School of Home Science, Sam Higginbottom Institute of Agricultural, Technology and Sciences. *idli* was prepared with different varieties of brown rice, T₁ (Basmati brown) and T₂ (Jasmine brown) by using steaming as cooking methods. Organoleptic quality and nutritive value of the prepared products was evaluated. Sensory evaluation of prepared products was done by using nine point hedonic scale based score card. The nutritive value of the prepared products was calculated using food composition table given by Gopalan *et.al.* (2004). From the results, it is concluded that brown rice can be used in place of white rice in *Idli* in order to enhance the nutritive value. Prepared product was acceptable on the basis of sensory evaluation. In *Idli* T₁ (basmati brown) was more acceptable than T₂ (Jasmine brown). The Maximum content of energy, protein and iron was found in treatment T₁ (368Kcal /100 gm, 12.15g/100gm, 4.8mg/100gm respectively). Highest content of fiber and carbohydrates was found in T₂ (0.98gm/100gm, 78.65gm/100gm respectively).

FPT-O-10

PREPATION OF COW MILK LASSI BY INCORPORATION OF GINGER (*ZINGIBER OFFICINALE*) JUICE

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Lassi was prepared by incorporation ginger juice with different levels viz., Control T₁ without ginger juice, 1 (T₂), 2 (T₃), 3 (T₄) and 4 (T₅) per cent by weight of dahi. Milk was standardized to 4 per cent fat. Cane sugar @ 8 per cent and water @ 10 per cent to the final weight of *lassi* were common for all the treatments. *Streptococcus lactis* and *Streptococcus cremoris* were used @ 1 per cent of the milk. The product obtained was subjected to chemical analysis and sensory evaluation. On an average the fat content of *lassi* was 4.03, 3.91, 3.88, 3.85 and 3.81 per cent, TS 18.40, 18.33, 18.26, 18.21 and 18.18 per cent, titratable acidity 0.71, 0.68, 0.65, 0.63 and 0.60 per cent, protein 3.70, 3.66, 3.63, 3.60 and 3.57 per cent and moisture content of the final *lassi* was 81.60, 81.67, 81.74, 81.79 and 81.82 per cent, for Control T₁, T₂, T₃, T₄ and T₅, respectively. The overall acceptability score of the *lassi* for Control T₁, T₂, T₃, T₄ and T₅ was 6.50, 7.53, 8.63, 7.81 and 7.78, respectively. The cost of *lassi* was increased with increase in the level of ginger juice. The cost of production was higher (Rs. 38.55 per kg) in *lassi* prepared with 4 per cent ginger juice (T₅) whereas cost of production was lowest for Control T₁ *Lassi* (Rs. 36.55 per kg) while, the *lassi* prepared by adding 2 per cent ginger juice (T₃) was

Rs. 37.55 per kg, which was superiorly accepted by the panel of judges. Hence, taking into consideration both cost and overall acceptability scores, *lassi* prepared by incorporation of 2 per cent ginger juice was superior over rest of the treatments.

FPT-O-10

EFFECT OF DIFFERENT LEVELS OF WALNUT POWDER ON THE CHEMICAL ATTRIBUTES OF BURFI

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The present study was carried out on “Studies on preparation of *burfi* blended with walnut powder”. *Burfi* was prepared from buffalo milk (standardized with 5.5 % fat and 9 % SNF) with constant level of sugar (30 per cent by weight of *khoa*) and different levels of walnut powder (2, 4, 6 and 8 per cent by weight of *khoa*). It was observed that the overall acceptability score for treatment T₁, T₂, T₃, T₄ and T₅ were 8.76, 8.45, 8.16, 7.80 and 7.50 respectively. As the level of walnut powder in *burfi* increases the overall acceptability score decreases. The highest score for overall acceptability was found to be 8.76 for 2% walnut powder (like extremely) and lowest score was found to be 7.50 (like moderately to like very much). On an average walnut powder *burfi* of treatment T₁, T₂, T₃, T₄ and T₅ contained moisture 16.85, 16.59, 16.33, 16.07 and 15.82 per cent; fat 21.95, 22.79, 23.3, 24.74 and 25.31 per cent; protein 14.90, 15.30, 15.70, 16.00 and 16.32 per cent; ash 2.50, 2.60, 2.77, 2.85 and 2.92 per cent; carbohydrate 43.80, 42.72, 42.57, 40.60 and 39.64 and total solids 83.15, 83.41, 83.67, 83.92 and 84.18 per cent, respectively.

FPT-O-11

STUDIES OF PHYSICO-CHEMICAL COMPOSITION OF FINGER MILLET LASSI

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Lassi is one of the fermented milk products is ideal for serving with hot dishes as it helps the body to digest the spicy food. The composition is as the fat content of the *lassi* sample under treatment T₀, T₁, T₂, T₃ was 2.70, 2.34, 2.18 and 1.82, respectively and it differed significantly (P < 0.05) from each other. The protein content of finger millet *lassi* is differed significantly (P < 0.05) from each other. The ash content of T₀, T₁, T₂ and T₃ is 0.73, 0.75, 0.82, 0.85 percent respectively. The total sugar content of T₀, T₁, T₂ and T₃ was 14.43, 14.83, 15.51, 16.26 per cent, respectively and it differed significantly (P < 0.05) from each other. It is observed that the total solid content of T₀, T₁, T₂ and T₃ were 21.06, 21.53, 22.55,

23.11 per cent, respectively and it differed significantly (P < 0.05) from each other. The higher acidity content in T₀ while lower acidity content can observe in T₃ and it differed significantly (P < 0.05) from each other.

FPT-O-12

STUDIES ON TEXTURAL ANALYSIS OF BURFI BLENDED WITH WALNUT POWDER

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Burfi is famous Indian sweet; it retains its quality for considerable long period at atmospheric storage temperature due to its low moisture content and higher concentration of sugar. In the present study *burfi* was prepared by using walnut powder. *Burfi* sample was evaluated for textural qualities viz., Hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness. Hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness of the treatment (T₁) was 0.4623, 0.1834, 0.003, 15.051, 0.0847 and 1.2748 for treatment T₂ was 0.4650, 0.1141, 0.000, 15.201, 0.0530 and 0.8056 for treatment T₃ was 0.4807, 0.1596, 0.000, 15.149, 0.0767 and 1.1619 and for treatment T₄ was 0.5414, 0.1083, 0.000, 15.160, 0.0586 and 0.8893 T₅ was 1.1939, 0.1056, 0.001, 14.727, 0.1260 and 1.8556 respectively.

FPT-O-13

SENSORY AND NUTRITIONAL EVALUATION OF VALUE ADDED CAKES FORMULATED BY INCORPORATING BEETROOT POWDER

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Beetroots (*Beta vulgaris*) are rich in valuable, active compounds such as carotenoids, glycine betaine, saponins, betacyanines, folates, betanin, polyphenols and flavonoids. Therefore, beetroot ingestion can be considered a factor in disease prevention. It also contributes to health and wellbeing because it is known to have antioxidants called betalains. Beetroot powder (BRP) was incorporated in cakes at 0, 10, 15, 20, and 25 per cent level. The sensory evaluation revealed that 70 per cent of the panelists liked extremely, the cake with 20 per cent BRP incorporation. Sensory evaluation using Score Card method showed that overall acceptability of cake with 20 per cent BRP was 9.15 out of 10 i.e. maximum. Physical parameters of cakes including volume, specific volume, volume index, symmetry index, and uniformity index were also studied. Nutritional evaluation of cakes revealed that

as the level of BRP incorporation was increased from 0 to 25 per cent in cakes, crude protein, crude fat, crude fibre and total ash increased from 6.10 to 12.4%, 23.5 to 29.4%, 1.1 to 7.4%, 3.5 to 12.1 % respectively. Among minerals (mg/100g) i.e., iron, calcium, and phosphorus increased from 0.1 to 2.7, 32.0 to 64.0, and 310 to 532 respectively. Total Antioxidant Activity increased from 5.5 to 47% and Folic Acid from 0.24 to 1.9 mg/100g with the increase in BRP incorporation. Cake formulated using 20 per cent BRP had protein, fat, fibre, iron, calcium, folic acid and total antioxidant activity as 11%, 29.2%, 6.7%, 1.8 mg/100g, 52 mg/100g, 1.55 mg/100g, 29.4% respectively. Therefore, it might be concluded that nutrient rich cakes can be formulated using up to 20 per cent BRP incorporation without affecting its quality adversely.

FPT-O-14

EFFECT OF TRADITIONAL PROCESSING METHODS ON PROTEIN DIGESTIBILITY AND STARCH DIGESTIBILITY OF FIELD PEA (*PISUM SATIVUM*)

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Grain legumes are important sources of proteins, minerals and vitamins for millions of people in the world, particularly in the developing countries. Low digestibility of legume protein and starch is one of the main drawbacks limiting the nutritional quality of food legumes. Processing treatments have been reported to be beneficial for enhancing the nutritive value of various food legumes, as they reduce the content of anti nutritional factors and improve the digestibility of carbohydrate and protein. The present study was undertaken to determine the variability in starch and protein digestibility of field pea varieties and to investigate the effect of processing on *in vitro* protein and starch digestibility. Protein digestibility of field pea varieties varied from 63.29 to 76.50%, variety HFP-9426 having lowest protein digestibility. A significant difference was found among varieties HFP-4, HFP-529 and HFP-9426 for protein digestibility. Among all the processing methods highest improvement in protein digestibility over the unprocessed varieties was found due to germination (16.14 to 40.38%). Starch digestibility of field pea varieties varied from 22.00 to 29.33 mg maltose released/g being highest in variety HFP-4. Highest increase in *in vitro* starch digestibility was observed after dehulling (71.24 to 113.87%) followed by germination (22.53 to 72.20%), roasting (4.54 to 36.12%) and soaking (14.99 to 25.00%).
Keywords: Field pea, soaking, dehulling, roasting, germination, protein digestibility, starch digestibility.

FPT-O-15

SENSORY EVALUATION OF GULABJAMUN PREPARED FROM DIFFERENT READY MIXES

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Sensory evaluation of any consumable product is the best method of judging the acceptability of the product by the consumers. The present experiment was conducted to evaluate the sensory attributes viz., colour and appearance, body and texture flavour, overall acceptability and cost of production per kg *gulabjamun* prepared from different ready mixes. The sensory evaluation was carried out by the panel of 10 judges, showed that, the *gulabjamun* prepared from *khoa* has highest score for all sensory qualities and overall acceptability as compared to other ready mix treatments. However, the score obtained by the *gulabjamun* prepared from different ready mixes for all the sensory attributes was nearly the same. The cost of production per kg *gulabjamun*, prepared from *khoa* was less as compare other ready mixes.

FPT-O-16

UTILIZATION OF CARROT (*DAUCUS CAROTA*) JUICE FOR PREPARATION OF FLAVOURED MILK

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Flavoured milk was prepared with different combinations of milk and carrot juice viz. 98:2 (T₁), 96:4 (T₂), 94:6 (T₃) and 92:8 (T₄). The purpose of present investigation was to standardize the optimum level of carrot juice on the basis of physico-chemical properties and sensory and organoleptic evaluation of flavoured milk. Sensory evaluation carried out showed that, the different levels of carrot juice had a significant effect on sensory attributes such as colour and general appearance, taste, acceptability and overall acceptability of carrot *flavoured milk*. *Flavoured milk* prepared by blending with 4 parts of carrot juice (T₂) had secured the highest score (92.66 out of 100). On an average ash and acidity percentage of flavoured milk were increased with increase in level of carrot juice, while fat, total solids, solids not fat and protein content were decreased with the increase in level of carrot juice. *Flavoured milk* prepared by blending with 4 parts of carrot juice (T₂) has 2.69 per cent fat, 19.08 per cent total solids, 16.39 per cent solids not fat, 0.18 per cent acidity, 3.31 per cent protein and 0.78 per cent ash. The cost of production of *flavoured milk* was increased with increasing level of carrot juice. The cost of production was

Rs. 50.59 per litre for T₁ with 2 parts of carrot juice while, it was Rs. 51.93 per litre T₄ with 8 parts of carrot juice. The *flavoured milk* prepared by blending with 4 parts carrot juice costing Rs. 51.09 per litre which was superiorly accepted by the panel of judges. Hence, it is concluded that best quality carrot *flavoured milk* can be prepared by using 4 parts of carrot juice and 96 parts of milk with 8 per cent sugar.

FPT-O-17

COMPARATIVE STUDIES OF GULABJAMUN PREPARED FROM DIFFERENT READY MIX

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Among the Indian sweets, *gulabjamun* is the most important milk product throughout the country. Traditionally *gulabjamun* is prepared from the mixture of *khoa*, wheat flour (Maida) and baking powder, few readymade *gulabjamun* mix powder are sale in the market. The present experiment was conducted to find out the chemical composition and sugar syrup absorption rate of *gulabjamun* prepared from different ready mixes. The results obtained after comparative studies showed that, the *gulabjamun* prepared from *khoa* contained significantly more total solids, fat, protein and ash as compared to other ready mixes. The sugar syrup plays a key role in volume expansion, weigh increase, change in mouth feel quality and sponginess of *gulabjamun*. The sugar syrup absorption rate of *gulabjamun* prepared from ready mixes was significantly higher as compared to *gulabjamun* prepared from *khoa*.

FPT-O-18

UTILIZATION OF GULKAND IN THE PREPARATION OF SHRIKHAND

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Shrikhand was prepared with addition of gulkand at different levels viz., 1.5 (T₁), 2.0 (T₂), 2.5 (T₃) and 3.0 (T₄) per cent by weight of *chakka*. The sensory evaluation for overall acceptability carried out by the judges, showed that *shrikhand* prepared by adding 2.5 per cent gulkand (T₃) had secured the highest score and contained 9.57 per cent fat, 52.32 per cent total solids, 6.83 per cent protein, 1.63 per cent titratable acidity and 1.26 per cent acidity. The cost of production of *shrikhand* was increased with the increase in the levels of gulkand. The cost of production was higher in T₄ with 3 per cent gulkand level was Rs. 118.11 per kg, while, the *shrikhand* prepared by blending with 2.5 percent gulkand costing Rs.117.26 per

kg which was superiorly accepted by panel of judges. Hence, it is concluded that good quality *shrikhand* can be prepared by using 2.5 per cent gulkand (T₃) had mild pleasant flavour, smooth body and texture and light reddish colour.

FPT-O-19

UTILIZATION OF CARROT (*DAUCUS CAROTA*) FOR KHEER PREPARATION

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The present investigation was conducted to utilize valuable and nutritious shredded carrot with cow milk for preparation of *kheer* with objectives to standardize the optimum level of carrot, to assess physico-chemical composition, sensory evaluation and cost for *kheer* prepared from different levels of shredded carrot. The cow milk was standardize at 4 per cent fat and *kheer* was prepared with four level of milk and shredded carrot in the proportion of 90:10 (T₁), 85:15 (T₂), 80:20 (T₃) and 75:25 (T₄) with 8 per cent sugar common for all. On an average fat content of *kheer* was 7.23, 6.85, 6.45, and 5.99 per cent, protein 5.81, 5.54, 5.25 and 4.97 per cent, total solids 30.10, 31.13, 32.15 and 33.11 per cent, moisture 69.90, 68.87, 67.85 and 66.89 per cent and ash content 1.54, 1.68, 1.84 and 2.00 per cent for T₁, T₂, T₃ and T₄ treatments, respectively. It was observed that overall acceptability score out of 9 for T₁, T₂, T₃ and T₄ was 7.83, 8.41, 8.13 and 7.12, respectively. The production cost of most acceptable *kheer* prepared by adding 15 parts of shredded carrot (T₂) was Rs. 73.07 per kg. Taking into consideration composition sensory and overall acceptability score, good quality of carrot *kheer* can be prepared by using 15 parts of shredded carrot to 85 parts of milk with 8 per cent sugar.

FPT-O-20

UTILIZATION OF AIR POTATO (*DIOSCOREA BULBIFERA*) FLOUR FOR PREPARATION OF BURFI

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Burfi was prepared in the proportion of 100:0 (T₁) 97.5:2.5 (T₂), 95:5 (T₃), 92.5:7.5 (T₄), and 90:10 (T₅) *khoa* to air potato flour with 30 per cent sugar common for all treatments. The sensory evaluation carried out, showed that the different levels of air potato flour had a significant effect on improving the quality regarding flavour, body and texture, colour and appearance and overall acceptability of *burfi*. The overall acceptability indicate that the *burfi* prepared by blending with 7.5 parts of air potato flour (T₄) had the highest score (95.8) and ranked as

a most acceptable treatment. The total solids of *burfi* were increased with increase in level of air potato flour, while fat, protein, moisture, acidity, and ash were decreased with the increase in level of air potato flour. The *burfi* prepared with addition of 7.5 part of air potato contained 17.12 per cent fat, 11.87 per cent protein, 88.40 per cent total solids, 11.60 per cent moisture 0.18 per cent acidity, and 2.55 per cent ash with Rs.218.29 per kg cost of production. The cost of production of *burfi* was decreased with the increase in the level of air potato flour. The cost of production of Control *burfi* (T₁) without air potato flour was Rs. 223.06 per kg. Hence, it is concluded that best quality air potato *burfi* can be prepared by using 7.5 parts of air potato flour and 92.5 part of *khoa* with 30 per cent sugar.

FPT-O-21

EFFECT OF DIFFERENT LEVELS OF AIR POTATO (*DIOSCOREA BULBIFERA*) PULP ON QUALITY OF ICE CREAM

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The present investigation was conducted to evaluate the chemical and sensory characteristics of *ice cream* prepared with different levels of air potato pulp viz., Control without air potato (T₁), 97.5:2.5 (T₂), 95:5 (T₃), and 92.5:7.5 (T₄) part by weight and sugar @ 15 per cent was common for all the treatments. Milk was standardized to 4 per cent fat. The different levels of air potato pulp had a definite effect on improving the quality regarding flavour, body and texture, colour and appearance and melting point of *ice cream*. The sensory evaluation for overall acceptability was carried out by the judges, showed that *ice cream* prepared by blending with 5 part of air potato pulp was most acceptable treatment and contained 9.13 per cent fat, 36.75 per cent total solids, 3.84 per cent protein, 1.14 per cent ash and 32.05 minutes of melting point. The cost of production of *ice cream* was increased with the increase in the level of air potato pulp. Hence, it can be concluded that best quality air potato *ice cream* can be prepared by using 5 parts of air potato pulp having Rs. 130.66 per kg cost of production.

FPT-O-22

QUALITY OF MILK SOLD IN NAGPUR CITY

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Adulteration of milk is common practice by addition of water and some foreign matter to milk or by removing any valuable ingredient (like fat) from it for making more profit by the producers. The present was

investigation conducted to assess the physico-chemical properties of raw cow milk. A total 80 milk samples were collected from milk producers, milk vendors, organized and private dairy, respectively and analyzed for physico-chemical quality and detection of adulteration in milk. The results indicates that the highest per cent of milk samples for specific gravity level below 1.028 were found in private dairy (60.00%), lowest per cent were found in organized dairy (20.00%). For the fat level group, highest per cent of milk samples in group of 3.5 to 4.5 were found in organized dairy (85.00%), the lowest per cent were found in private dairy (45.00%) and for the SNF level group, highest per cent of milk samples showing the SNF level group of above 8.5 were found in milk producer (45.00%) and the lowest per cent were found in private dairy (15.00%). As indicated by specific gravity, the highest per cent of milk samples adulterated with water were found in private dairy (60.00%) followed by milk vendor (45.00%) and milk producer (30.00%). The lowest per cent of milk samples adulterated with water were found in organized dairy (20.00%). It was a good report for people of Nagpur city that nobody added adulterants like cane sugar, urea, starch, sodium bicarbonate and salt in their milk supply, except that they are adulterating milk with water.

FPT-O-23

STUDIES ON COST OF PRODUCTION OF BURFI BLENDED WITH DIFFERENT LEVELS OF ASH GOURD PULP

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The market demand for instant food and *burfi* is growing all over world and consumers are seeing new tastes. Hence taking in to consideration the market demand consumer preference attempts were made to prepare the *burfi* from *khoa* blended with ash gourd pulp. Ash gourd *burfi* from different proportion of buffalo milk blended with Ash gourd pulp 100:0 (T₁), 95:5 (T₂), 90:10 (T₃) and 85:15 (T₄) was prepared. The product obtained was subjected for evaluation of cost of production. The costs of production of T₁, T₂, T₃ and T₄ *burfi* were calculated as 179.60, 176.12, 172.64 and 169.16 Rs./kg, respectively. The cost production of T₁ i.e. control *burfi* was found to be highest as Rs.179.60 per kg. On the other hand lowest cost was recorded for treatment T₄ as Rs.169.16 per kg. It can be concluded that the ash gourd pulp can be well utilized for preparation of nutritious, palatable and low cost *burfi* by blending 5 per cent ash gourd pulp with 95 per cent *khoa* on weight basis.

FPT-O-24

EFFECT OF DIFFERENT LEVELS OF ASH GOURD ON CHEMICAL PROPERTIES OF BURFI

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Amongst the traditional Indian milk products *khoa* and *khoa* based sweets have high commercial significance. *Burfi* is popular milk based confection in India and likely to attain global status. Ash gourd *burfi* from different proportion of buffalo milk blended with Ash gourd pulp 100:0 (T₁), 95:5 (T₂), 90:10 (T₃) and 85:15 (T₄) was prepared. The product obtained was subjected for chemical analysis and organoleptic evaluation. On an average the moisture content of ash gourd *burfi* was found to be 14.30, 16.70, 18.75 and 20.15 per cent, fat 16.45, 15.30, 14.80 and 14.20 per cent, protein 13.80, 13.05, 12.15 and 11.60 per cent, ash 2.70, 2.66, 2.58 and 2.48 per cent, carbohydrate 52.72, 52.26, 51.69 and 51.54 per cent and total solids 85.70, 83.30, 81.25 and 79.85 per cent for treatment T₁, T₂, T₃ and T₄ respectively. It was also observed that as the blending of ash gourd pulp increased, there was decrease in fat, protein, ash, carbohydrate and total solids content of ash gourd *burfi* and increase in moisture content. It was also observed that the overall acceptability score for treatment T₁, T₂, T₃ and T₄ was 8.68, 8.53, 7.99 and 7.21, respectively.

FPT-O-25

STUDIES ON COST OF PRODUCTION OF HERBAL SOFTY ICE CREAM

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Milk having high nutritional value, ginger and turmeric with medicinal value. The combination of both fulfils a great achievement in the form of 'Herbal softy ice Cream' in affordable cost. Herbal softy ice cream was prepared with acceptable level of ginger juice and 0.0, 0.2, 0.4, 0.6 and 0.8 per cent turmeric powder blended with other ingredients. Cost of ice cream prepared from cow milk in combination with acceptable level of ginger juice and different levels of Turmeric powder was worked out. While, estimating the cost of the finished product, the cost of the ingredients used in the preparation of Herbal softy ice cream was rated as per the prevailing (2011-12) market price. In addition to these, fuel cost, miscellaneous cost and the labour charges were also considered to calculate the cost of production. The cost of production of Ginger and Turmeric ice cream (per lit) was calculated as Rs.

100.50, 106.50, 107.70, 108.90 and 110.10 for treatment T₁, T₂, T₃, T₄ and T₅, respectively. It was found that as the Turmeric level increased, the cost of production was also increased. The cost of production of control sample was lowest among all the treatment combinations.

FPT-O-26

STUDIES ON CHEMICAL COMPOSITION OF HERBAL SOFTY ICE CREAM

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In recent years ice cream is getting great popularity in India particularly in big cities and towns. Ice cream has great nutritive value. Turmeric is being used to a limited extent as, colouring and flavouring in ice cream by small scale ice cream manufactures. Herbal softy ice cream was prepared with acceptable level of ginger juice and 0, 0.2, 0.4, 0.6 and 0.8 per cent turmeric powder blended with other ingredients. The ice cream in treatment T₁ with no addition of turmeric powder content maximum percentage of titratable acidity (0.204%) followed by T₂ (0.196%), T₃ (0.193%), T₄ (0.192%), T₅ (0.191%). The ice cream in treatment T₁ has maximum fat per cent i.e. 10.51 followed by T₂ (10.49), T₃ (10.48), T₄ (10.45), T₅ (10.44) per cent. The values obtained for total solids content of Ice-cream were 37.46, 37.47, 37.57, 37.66 and 37.77 in treatments T₁, T₂, T₃, T₄ and T₅, respectively. The treatment T₅ required maximum time for the melting of ice cream (34.06 min.) followed by T₄ (33.98 min.), T₃ (32.40 min.), T₂ (32.28 min.), T₁ (30.32 min.). The ice cream prepared from 4 per cent Ginger juice and 0.4 per cent Turmeric powder (T₃) was found superior which secure highest sensory score 8.57 for overall acceptability.

FPT-O-27

STUDIES ON PREPARATION OF SOYPANEER

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The main objective of present investigation was to study sensory quality of *paneer* and to find out acceptable level of blending. The buffalo milk used for preparation of soypaneer contained 84.2 per cent moisture, 6.6 per cent fat, 3.9 per cent protein, 5.2 per cent lactose, 0.8 per cent ash, and 16.5 per cent total solids. While in soymilk 93.3 per cent moisture, 1.40 per cent fat, 4.20 per cent, 0.85 per cent lactose, 0.60 per cent ash and 6.47 per cent total solids. The *paneer* was prepared from buffalo

milk with addition of soymilk in the proportion of 100:00 (T1), 75:25 (T2), 50:50 (T3), 25:75 (T4), and 00:100 (T5). Soymilk with 25 to 100 per cent level was used as blending with buffalo milk for preparation of *paneer*, significantly affect the fat, lactose, total solids and yield of *paneer*. Protein and moisture content increased significantly as soymilk proportion increased from 25 to 100 per cent. The overall acceptability of *paneer* prepared from buffalo milk is acceptable in all respect but with addition of soymilk in proportion of 75:25 was good quality and acceptable for value addition and cost structure, for other 50:50, 25:75, and 00:100 were fair quality.

FPT-O-28

DEVELOPMENT AND QUALITY ANALYSIS OF AONLA BLENDED PINEAPPLE SQUASH

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Studies were conducted on aonla blended pineapple squash and its shelf life studies. Pineapple juice was blended with aonla juice in different proportion (i.e. 20%, 30%, 40%, and 50%). Physico-chemical parameters of aonla blended pineapple squash were analyzed for 2 months. The stored samples were drawn after every 15 days of interval for physical, chemical and microbial evaluation. During shelf life study it was observed that acidity content of control and treatment show slight decrease in acidity from zero to 60 days. Maximum acidity found in fresh samples, as we blended aonla juice with pineapple juice acidity was decrease. Maximum acidity found in fresh sample. During 60 days of storage periods there was increase in ascorbic acid, reducing sugar, TSS and pH. Samples were evaluated after at the interval of 15, 30, 4s and 60 days for sensory .On the basis of overall sensory attributes, colour of sample 50%-50% aonla blended pineapple squash had better appearance as compare to other samples. Flavour, Aroma, Taste, and Overall Acceptability of sample 50%-50% aonla blended pineapple squash got higher score than other samples. But the other samples found to be acceptable. Its score was slightly decreased during storage. During 60 days of storage period microbial analysis was done. In first 15 and 30 days there was no colony formation in yeast and mould count analysis. But after 45 and 60 days there was yeast and mould growth was found. The shelf life of product was stable up to 30 days during storage period. Key words: Squash, Aonla blended pineapple squash, TSS.

FPT-O-29

DEVELOPMENT OF NOODLE USING BANANA PEELS AS A FUNCTIONAL INGREDIENT

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Banana (*Musa paradaisica*), is grown worldwide and consumed as ripe fruit or used for culinary purposes. The peel of banana represents about 40% of the total weight of fresh banana and has been underutilized. Its rich in dietary fibre, carotenoid, protein, PUFA, Calcium and potassium. The aim of the study was to incorporate banana peels powder (BPP) in the preparation of noodles, to determine the nutrient composition of BPP and noodle as well as to assess the organoleptic quality and cost. Noodles were made by incorporating BPP at three different ratios (Refined flour: BPP; 90: 10, 80: 20and 70: 30respectively) named as T₁, T₂ and T₃. Noodles prepared from the refined flour only served as control (T₀). The noodles were organoleptically evaluated by Nine Point Hedonic Scale. The nutritional composition of product was chemically analyzed by using the AOAC (2005) methods. Appropriate statistical technique was opted for the analysis. On the basis of sensory evaluation T₁ (90:10) was most acceptable with regards to overall acceptability. There was a significant difference between the sensory attributes of different treatments at 5% significance level. The proximate compositions of dehydrated BPP were 7.76g Protein, 9.8g Carbohydrate, 244.68mg calcium, and 212 mgphosphorus. The nutritional composition increased with increase in substitution level of *BPP*. The cost of the noodles per 100g wasRs3 on the raw basis. The nutritional compositional of banana peel indicates that if it is used as a supplement, it can provide natural calcium. It can be incorporated to develop a value added product. Hence banana peel can be exploited for their nutritional value. Key Words: *Musa paradaisica*, underutilized, banana peels powder (BPP) and Noodles

FPT-O-30

DEVELOPMENT OF MICRONUTRIENT RICH HEALTHY SNACK USING MAIZE FLOUR AND MORINGA OLEIFERA LEAVES

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Moringa oleifera (drumstick tree), also known as 'mother's best friend' and commonly known as saijna or moonga, is considered as the miracle tree due to its marvelous nutritional and medicinal values from ancient time. The present research was carried out with the objective to estimate the nutrient composition of

dehydrated *Moringa oleifera* leaves and Maize flour, to develop a healthy snack (biscuit) as well as to assess the sensory acceptability, its nutrient composition and cost. Dehydrated *Moringa oleifera* leaves and maize flour were incorporated at three different ratios named as T₁, T₂ and T₃ (3: 27, 6: 29 and 9: 31 respectively). Biscuits prepared from the refined flour only served as control (T₀). The biscuit was organoleptically evaluated by Nine Point Hedonic Scale. The nutritional composition of the dehydrated *Moringa oleifera* leaves and product was chemically analysed by using the AOAC (2005) methods. The proximate composition of dehydrated *Moringa* leaves powder was higher in Protein (22.25mg), calcium (2088.13mg), phosphorus (213.3mg) and β-carotene (47700μg). On the basis of sensory evaluation, treatment T₁ (3: 27) was most acceptable with regards to overall acceptability. There was a significant difference between the sensory attributes of different treatments at 5% significance level. The nutritional composition increased with increase in substitution level of *Moringa oleifera* and Maize flour. The cost of the product (*Biscuit*) per 100g ranged from Rs 12.72-12.55. *Moringa* being rich in all micronutrients and affordable will serve as substitute for food from other sources. Keywords: AOAC, Maize, Micronutrients, and *Moringa oleifera* leaves.

FPT-O-31

PREPARATION OF GULABJAMUN FROM KHOA PREPARED BY BLENDING OF SWEET CORN MILK WITH BUFFALO MILK

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Gulabjamun prepared by blending of sweet corn milk with buffalo milk was prepared from different combinations of sweet corn milk and buffalo milk i.e. 20, 30 and 40 per cent of sweet corn milk with 80, 70, and 60 per cent of buffalo milk. All the treatments obtained were subjected for chemical analysis. The average fat per cent in *gulabjamun* was 14.98, 13.66, 12.10 and 10.26 per cent, the average protein content was found to be 8.49, 7.85, 7.31 and 6.87 per cent, total sugar content was found to be in increasing order from T₀ to T₃ as 47.30, 48.56, 50.95 and 51.32, the average moisture content of the product was found to be 34.21, 34.71, 35.51 and 35.86 per cent, the mean ash content in the finished product was found to be 1.10, 1.01, 0.90 and 0.81 per cent and the average total solids content of the finished product were found to be 65.78, 65.28, 64.43 and 64.13 per cent. Sugar syrup absorption was 81.00, 79.92, 78.95 and 78.73. It was observed that the blending of sweet corn milk increased, there was decrease in fat, protein, ash, total solids and sugar absorption content of *gulabjamun* prepared by blend of buffalo milk with sweet corn milk and increase in total sugar, moisture content. The acceptable *gulabjamun* can be prepared by using 30 per cent sweet corn milk and 70 per cent buffalo milk. Key Words: Physico-chemical Properties, Sweet corn Milk, Buffalo milk, *Gulabjamun*.

FPT-O-32

STUDIES ON PHYSICO-CHEMICAL PROPERTIES OF SHRIKHAND PREPARED FROM SWEET CORN MILK BLENDED WITH BUFFALO MILK

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Shrikhand was prepared from different combinations of sweet corn milk and buffalo milk i.e. 20, 30 and 40 per cent of sweet corn milk plus buffalo milk. All the treatments obtained were subjected for chemical analysis. On an average the moisture content of *Shrikhand* blended with sweet corn milk was found to be 32.5, 33.8, 34.3 and 35.9 per cent, fat 9.3, 8.4, 7.4 and 6.5 per cent, protein 9.14, 8.72, 8.33 and 7.74 per cent, ash 0.84, 0.73, 0.64 and 0.45 per cent, carbohydrate 60.3, 65.2, 70.3 and 74.5 per cent and total solids 67.45, 66.2, 65.65 and 64.07 per cent for treatment T₀, T₁, T₂ and T₃, respectively. It was also observed that as the blending of sweet corn milk increased, there was decrease in fat, protein, ash, total solids content of *Shrikhand* blended with sweet corn milk and increase in moisture and total sugar content. It was also observed that the colour and appearance score for treatment T₀, T₁, T₂ and T₃ was 8.4, 8.5, 8.6 and 8.2 respectively. Flavour score was 8.0, 7.7, 7.6 and 7.0 respectively. Body and texture was 8.0, 8.2, 8.2 and 7.4 respectively. Sweetness score was 7.8, 7.7, 7.9 and 6.6, respectively. Overall acceptability scores for treatment 8.0, 8.0, 8.1 and 7.3 respectively. The acceptable *shrikhand* can be prepared by using 30 per cent sweet corn milk and 70 per cent buffalo milk.

Key Words:- Physico-chemical Properties, Sweet corn Milk, *Shrikhand*.

FPT-O-33

QUALITY EVALUATION OF PANEER PREPARED WITH SOY MILK INCORPORATION

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Milk is a nutritious food commodity and consumed by all the social communities without any stigma attached to it like other animal products. Soyabean is known for its high protein content and variety of products prepared from it especially tofu. In the present research work, experiments were conducted to prepare paneer from a combination of whole milk and soya milk. The soy milk prepared in the lab, was incorporated at the levels of 35% and 50% in the whole milk (composite) and paneer was prepared by coagulating it at 80° C by addition of 2% citric acid solution. Sensory characteristics and

physico-chemical properties of the products were analyzed. Sensory evaluations showed good to very good acceptability of the prepared paneers. Further, results showed that the products prepared with soya bean milk incorporation had higher yield in comparison to the product prepared from only milk. The moisture and protein content were also higher in the treatment products than the control product.

FPT-O-34

PHYSICO-CHEMICAL ATTRIBUTES AND MARKET ACCEPTABILITY OF CHHANA WHEY BEVERAGE USING YC-470 CULTURE

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Whey is a major by-product of dairy industry and is obtained during the preparation of a number of dairy products such as chhana, paneer, cheese, casein, shrikhand, chakka etc. In tropical country like India a major portion of whey being wasted due to lack of proper transport facilities, proper cold storage facilities or proper processing facilities. Careless disposal of whey not only results in loss of valuable nutrients but also damages environment due to its high BOD value. In India specially northern part of country a large quantities of chhana whey is produced and is disposed without any processing that create a major environmental pollution. In our present study we prepared chhana based fermented whey drink using yoghurt culture (YC-470) at various level (0%, 1%, 1.5%, 2%). We checked various physico-chemical parameters of acidity, fat, P^H, protein, lactose etc and also sensory profile of all fermented drinks by a huge population of Mohanpur market, Nadia, West Bengal. Our results indicated that 2% addition of YC-470 culture gave superior quality of whey drink. So chhana based whey drink using YC-470 culture could be a great alternative for utilization of chhana whey and it has potential market acceptability.

FPT-O-35

EFFECT OF CARNAUBA WAX COATING ON SHELF LIFE OF CAPSICUM

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The present study was conducted to assess the optimum dilution of carnauba wax coating on capsicum and to study its shelf life. The four wax dilutions (3.7%, 4%, 4.3% and 4.8%) were coated on fresh capsicum samples and studied for shelf life for 60 days at room temperature (27-30°C) and for 65 days at low temperature (15°C); along with the control. The samples were analyzed on the basis of flavor, body and texture, color and appearance and overall acceptability on 9-point Hedonic scale. Appropriate statistical methods were used for data

analysis. The wax level of 3.7% was considered best. Mean values of flavour exhibited maximum (8.5) score at room and at low temperature. Mean values of body and texture had the maximum score of 6.5 after storage for 60 days at low temperature. Mean values of colour and appearance was decreased during storage at room and at low temperature. Mean values of overall acceptability had the maximum score of 6.5 after storage for 60 days at low temperature. Edible coating in combination of antifungal and anti-browning agents significantly increases the shelf life of fresh and minimally processed vegetables.

FPT-O-36

STORAGE QUALITY STUDIES OF ALL MUTTON AND RABBIT MEAT BLENDED MUTTON SAUSAGES

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Shelf life is important aspect of new product development. Chemical composition and other intrinsic factors of meat which have got bearing on shelf life of product vary species to species. Reports suggest that the microflora associated with the spoilage of rabbit meat were similar to those of red meats. Present study was undertaken to evaluate the keeping quality of all mutton sausages and rabbit meat blended mutton sausages (50:50) incorporated with 0.4% tetrasodium pyrophosphates. Two types of sausages were packaged in LDPE bags with and without vacuum and stored at 4±1°C and qualities were studied for physico chemical parameters, microbial profile and sensory characteristics on 0, 7th and 14th day of refrigerated storage. Vacuum packaged sausages showed significantly lower total plate counts, psychro trophic counts, TBA value and pH value than that of non vacuum packaged sausages. In general sensory scores for all the attributes decreased with the advancement of storage period. Both types of sausages were found acceptable on 14th day of refrigerated storage.

FPT-O-37

CARCASS QUALITY OF COMMERCIAL BROILER CHICKEN AS INFLUENCED BY DRINKING STRUCTURED WATER

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Open and bore well water are commonly used as drinking water in majority of the poultry farms in India. When the drinking water is passed through specially designed apparatus in which tuned geometry is reported to create an energy environment for the water to structure

itself, results in lower surface tension and better hydrating properties. This geometric technology was said to break up large low energy water molecule clusters into smaller high energy clusters leading to high solubility of minerals and vitamins. In order to study the influence of structured water on carcass quality of commercial broiler chicken, an experiment was conducted using 216 numbers of Vencobb chicks up to 42 days of age. The birds were assigned to two groups comprising of nine replicates per group with 12 birds per replicate. The control group (n=108) was offered tap water whereas the treatment group was offered structured water for drinking purpose. At the end of the experimental period, a total of 48 birds at the rate of 24 birds from each group (two birds from each replicate) were slaughtered to study the carcass quality. Hot carcass weight, dressing percentage and weights of skin plus feather, feet, head blood, liver, gizzard, thymus and bursa did not vary significantly between the two groups. The heart and spleen weights were significantly ($P<0.05$) high and abdominal fat content was low ($P<0.05$) in structured water group as compared to tap water offered group. Though statistically not significant, the intestinal length was relatively more in structured water group. From this study, it can be inferred that offering structured water to commercial broiler chicken for drinking purpose positively influences the carcass quality.

FPT-O-38

STORAGE QUALITY OF MINIMALLY PROCESSED CAULIFLOWER UNDER ACTIVE MAP

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Storage quality of minimally processed cauliflower under active modified atmosphere packaging (MAP) was investigated. Sachets of moisture absorbents (PHP:paddy husk powder; SG:silica gel; MSF:mustard seeds flour, 5 g each) were put inside active MAP along with MPC and stored at 3 ± 1 °C and 90% RH. The sample packed with SG had maximum physiological loss in weight (2.54%). The SG absorbed significantly in-pack water vapor (71.45 % of its weight) followed by PHP (32.18 %) and MSF (31.50 %). Total phenol content (mg/100 g) was increased to 183.6 from 162.7. Ascorbic acid retention was maximum in the samples packed with SG (88.27%) followed by MSF (87.46%), PHP (87.16%) and control (85.65%). Total microbial load (4×10^6 cfu/g) was lowest in sample packed with MSF while it was highest in control (16×10^6 cfu/g). The samples packed with MSF, PHP and SG had good overall sensory quality score and less water vapor accumulation than control while slight wilting was observed in samples packed with SG. The results indicate that PHP, SG and MSF have potential to prevent excess water vapor and subsequent condensation inside MAP for extending shelf-life and maintaining quality of minimally processed cauliflower.

FPT-O-39

DEVELOPMENT OF PROTEIN RICH MULTIGRAIN NUTRITIONAL LADDU

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Food formulations are the art or process of developing a mixture of ingredients to create a desired end product and are made by combining raw materials in specific proportion. An attempt was made to develop and assess the nutritional qualities of value added product prepared and were standardized by incorporating sesame seeds and water melon seed to the ingredients coconut, cashewnut, peanut, honey, raisin and sugar. Sesame (*Sesamum indicum L.*) is one of the world's most important oil seed crops. Apart from being an important oilseed source, sesame seed is a potential source of proteins and calcium while water melon seed contain good amount of protein. The formulated laddus were experimentally standardized by factorial design into nine different ratios. The sensory analysis was done on 9 point hedonic rating scale with the help of the 12 panel members. The nine basic criteria's like appearance, colour, texture, flavor and taste were analyzed and the product T9 got maximum score (8.14) and it was selected as best product among the nine variations. The optimized laddu was analyzed for nutritional and antioxidant activity. The nutrient contents of the selected formulation T9 was energy value to be 37.176 kcal, carbohydrate gm, protein 9.294 gm, fat 31.25 gm, iron 8.05 mg and calcium 346.23 mg respectively. The cost analysis was done by calculating the price of all the ingredients used as per one serving. Keywords: laddu, factorial design, sesame seed, watermelon seed.

FPT-O-40

ADVANCES IN POST HARVEST PROCESSING OF ARID PRODUCE: A NOVEL APPROACH

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Pearl millet is a major cereal crop of arid region. It is hardy in nature and staple diet of the rural masses. However, there are some problem of rapid development of rancidity and bitterness in the flour which results in reducing its shelf life. Considering this, an extensive study was carried out on pearling of pearl millet grain and processing for its multiple uses and economic gains. Results indicate the increase in shelf life of pearl millet flour from pearled pearl millet grain. Further it enabled the extended use of the grit for baby energy food while remnants for preparing animal feed. Biscuits prepared from the flour of pearled grain were found to have wider acceptability. On the other hand, the problem of short shelf life of fruits and vegetables was also addressed. Novel solar dryers were developed and used successfully for

dehydrating tomato, watermelon, etc and making value added products. The available plentiful solar energy in the region and low humidity make the system more efficient. The novel feature of the dryer is its multipurpose utility besides added advantage that the dehydration process continues even in night. These PHT technologies would help in income generation while combating malnutrition.

FPT-P-01

FORMULATION OF EGGLESS CAKES BY INCORPORATING DIFFERENT LEVELS OF AMARANTH FLOUR AND ITS ACCEPTABILITY

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Grain amaranth (*Amaranthus* spp.) is protein-rich pseudo cereal. Amaranth is one of those rare plants whose leaves are eaten as a vegetable while the seeds are used as the cereals. Eggless cakes were prepared by using different levels of amaranth flour into refined wheat flour with the constant level of whey protein concentrate by method of U.S. Wheat Associates in 198. Cakes prepared from blends containing varying proportions (20, 40, 60, 80 and 100 per cent) of amaranth flour, using the sponge cake method. The overall acceptability scores of 40 per cent amaranth flour cakes were maximum and more than control for cakes (8.3). The score for colour of cakes showed decreasing pattern with incorporation of amaranth flour. The findings of the study suggest that amaranth flour suitable for baked products especially cakes as it contained higher amount of protein. Based on the results of organoleptic characteristics products containing up to 40 per cent amaranth flour can be used for commercial level. Key words: Amaranth, cakes, whey protein concentrate.

FPT-P-02

PREPARATION OF LOW FAT KHOA USING WHEY PROTEIN CONCENTRATE AS FAT REPLACER

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In recent years, there has been an increased consumer interest and demand for low fat food products. This interest stems from health concerns over conditions such as obesity and heart disease. Fat contributes to flavour, or the combined perception of mouthfeel, taste, and aroma/odour. It also contributes to creaminess, appearance, palatability, texture and lubricity of foods and increases the feeling of satiety during meals. Fat can also carry lipophilic flavour compounds, acts as a precursor for flavour development (eg. by lipolysis or frying), and stabilize flavour. From a physiological standpoint, fat is a

source of fat soluble vitamins and essential fatty acids. Fat is the most concentrated source of energy in the diet, providing 9kcal/g. compared to 4 kcal/g for proteins and carbohydrates. In India most of the traditional dairy foods contain high fat and also high sugar. *Peda*, *Burfi*, *Gulabjamun* and *Kalakand* are the major *khoa* based sweets, which are highly popular among Indians mainly because of their delicious taste and high nutritional value. As per BIS standard *khoa* contains 30% fat on dry matter basis. Considering the importance of *khoa* in traditional dairy products and higher level of fat in it, this is decided to utilize different fat replacers to prepare low fat *khoa* which is helpful for the people on restricted diet. The study was undertaken to develop low fat *khoa* using WPC as fat replacer. *Khoa* was prepared from buffalo milk having 3% fat and 9% SNF maintaining the fat: SNF ratio to 0.33. 1% WPC was added at three different stages of *khoa* making viz. before concentration (at milk stage), at rabri stage (35 – 40% TS) and after concentration (while whipping). The sensory score for overall acceptability of low fat *khoa* using 100 point score card were 85.58, 87.50 and 85.17 respectively. After selection of appropriate stage for addition of WPC, i.e. at rabri stage (35-40% TS) different levels of WPC viz. 1% ,3% and 5% will be tried for selection of optimum level of WPC on sensory basis. The sensory score for overall acceptability of low fat *khoa* using 100 point score card were 85.85, 89.30 and 67.20 respectively. The maximum score was obtained for the product prepared by addition of 3% WPC at rabri stage during desiccation (89.30).

FPT-P-03

STUDIES ON CHEMICAL COMPOSITION OF PEDA BLENDED WITH WHEAT BRAN

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Peda prepared from plain buffalo milk *khoa* and buffalo milk *khoa* blended with wheat bran in different proportion such as (T₁) 0.2 per cent, (T₂) 0.4 per cent, (T₃) 0.6 per cent wheat bran by weight of milk and compared with control T₀ (without wheat bran) for its chemical composition. The average chemical composition of control *peda* (T₀) and *peda* blended with wheat bran 0.2 per cent (T₁), 0.4 per cent (T₂), 0.6 per cent (T₃) are as moisture 13.50, 13.70, 14.20 and 14.60 per cent, fat 21.11, 21.21, 21.46 and 21.82 per cent, protein 15.70, 16.25, 16.58 and 17.42 per cent, ash 2.57, 2.48, 2.35 and 2.20 per cent, fiber 0.0, 0.90, 1.81 and 2.75 per cent, carbohydrate 47.12, 46.36, 45.41 and 43.96 per cent and total solid 86.50, 86.30, 85.80 and 85.40 per cent, respectively.

FPT-P-04

STUDIES ON CHEMICAL COMPOSITION OF GULABJAMUN BLENDED WITH WHEAT BRAN

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Gulabjamuns prepared from plain buffalo milk *khoa* and buffalo milk *khoa* blended with wheat bran in different proportion such as (T₁) 0.2 per cent, (T₂) 0.4 per cent, (T₃) 0.6 per cent wheat bran by weight of milk and compared with control T₀ (without wheat bran) for its chemical composition. The average chemical composition of control *gulabjamun* (T₀) and *gulabjamun* blended with wheat bran 0.2 per cent (T₁), 0.4 per cent (T₂), 0.6 per cent (T₃) are as moisture 27.12, 27.42, 28.00 and 28.30 per cent, fat 14.89, 15.00, 15.17 and 15.37 per cent, protein 13.72, 14.00, 14.28 and 14.56 per cent, ash 2.59, 2.76, 2.55 and 2.32 per cent, fiber 0.55, 1.46, 2.32 and 3.25 per cent, carbohydrate 41.32, 40.82, 40.00 and 39.45 per cent and total solid 72.88, 72.58, 72.00 and 71.70 per cent respectively.

FPT-P-05

STUDIES ON SENSORY EVALUATION OF JUICE AND JELLY SUPPLEMENTED WITH HYDROCOLLOIDS USING RESPONSE SURFACE METHODOLOGY

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Physiochemical properties, pasting properties and organoleptic evaluation were studied for hydrocolloids incorporated pumpkin – carrot juice and jelly. The products were developed using Response surface methodology. A rapid visco analyser was used to determine the pasting properties of jelly. Physiochemical properties such as Total soluble solids (°Brix) were determined using hand refractometer for both the developed products. The nutrients such as energy, carbohydrates, protein, fiber, β carotene and vitamin C were calculated. Sensory evaluation was carried out on the samples for overall acceptability using 9 point hedonic scale by a panel of 10 judges. The pasting temperatures of jelly of different variations were ranged between 50 – 60°C respectively. Upon sensory analysis, the overall acceptability score for both jelly and juice ranged from 6 – 8 respectively. Regarding Total soluble solids, the third variation of jelly and sixth variation of juice had maximum value of 24° Brix and 10° Brix respectively. Regression analysis and ANOVA were conducted on the fitted model to examine the statistical significance of model terms. The study concluded that the use of RSM has revealed the

optimum concentration of hydrocolloid to be added to carrot pumpkin juice blend and jelly. The RSM results in combination with sensory evaluation result revealed that the combination of carrot pumpkin juice and jelly in the range 30% - 70% with 0.6g hydrocolloids gave acceptable qualities.

FPT-P-06

OPTIMIZATION OF PROCESS PARAMETERS FOR THERMALLY PROCESSED SHELF- STABLE STARCH BASED MILK DESSERTS

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Milk desserts are one of the most popular products consumed worldwide. They are usually formulated with milk, sugar, hydrocolloids, flavorings and colorants. Starches and gums are hydrocolloids frequently used in dairy systems to provide proper texture, moisture and mobility. Starch- gum interaction in food system can change the starch granule swelling and its rheological and gelatinization properties. Starches are low cost, versatile and highly functional raw materials which when used along with milk can help to produce nutritious products, thus ensuring a promising future for this cheap raw material. Many food applications of starch are limited due to viscosity loss during heating or shearing and the tendency to retrograde during cooling and freezing. Considering this, a study was conducted to evaluate four types of starches i.e. two native starches (potato and corn) and two modified starches for their suitability to be incorporated in dairy desserts which are thermally processed for increasing their shelf life. The major problem, which occurs in starch containing foods, is of retrogradation. In this study, product optimization was carried out which consisted of selecting the starch, optimizing the level of starch as well as the type as well as the type and level of hydrocolloids. Dry mix of ingredients was blended in milk and was sterilized at 121°C for 20 mins in retort containers (In-pack sterilization). For this study, accelerated retrogradation was carried out at 5°C and rheological as well as sensory evaluation tests were conducted and the results were compared with those obtained when the dairy desserts (gels) were stored at ambient temperatures (30°C).

FPT-P-07

EFFECT OF SUBCLINICAL MASTITIS ON CHEMICAL COMPOSITION OF GOAT MILK

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Sound health of the udder is the most important in

production of safe and suitable milk for human consumption. Goat mastitis should be considered as the serious condition because of reduction in quality and quantity of milk which can lead to potential zoonotic problems to the consumer. There are many managerial factors affecting milk production as well as milk consumption, of which mastitis is one of the important threatening and costliest factor. The present experiment was conducted with an objective to assess the quality viz., fat, SNF, TS and pH of goat milk affected by subclinical mastitis. The experimental material consisted of 20 normal and 20 subclinical mastitic milk samples from 20 goats having one normal quarter and other half affected by subclinical mastitis. Results obtained after testing the significance between subclinical mastitic milk and normal milk revealed that, the average fat, SNF, TS and pH content of affected samples were 3.82, 8.01, 11.88 per cent and 7.17, respectively and that of normal milk were 4.17, 8.48, 12.56 per cent and 6.37, respectively. The average fat, SNF and TS content of the affected samples decreased significantly ($P<0.01$) by 0.35, 0.47 and 0.77 units as compared to normal milk samples the average pH increased significantly ($P<0.01$) by 0.8 units in subclinical mastitis samples. Experimental results showed that, subclinical mastitis hampered the quality of goat milk.

FPT-P-08

UTILIZATION OF DATE (*PHOENIX DACTYLIFERA*) IN THE PREPARATION OF COW MILK BURFI

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The dates (*Phoenix dactylifera*) are highly delicious and favourite among Indian people. Date fruits provide abundant quantities of iron, potassium, calcium, nicotinic acid, small amount of protein, copper, magnesium, chlorine, sulphur, vitamin A, B₆ and B₁₂. Several studies have been carried out to incorporate dates in different food product such as bakery items, beverages, jam and other confections. Recently, promising results were obtained by using date paste to replace caramel in candy and fruit bars. In present experiment date paste was added in *burfi* will be very effective for future research in order to minimize the substantial losses of fruits during the post harvest handling. The levels of date paste used for *burfi* preparation were 2, 4, 6 and 8 per cent by the weight of *khoa* and a Control *burfi* without date paste. Sugar was added @ 25 per cent by the weight of *khoa*. On an average the fat content of *burfi* was 21.40, 18.75, 17.13, 16.47 and 15.26 per cent, TS content 77.43, 78.23, 79.32, 80.00 and 81.03 per cent, protein content was 13.64, 13.40, 13.04, 12.77 and 12.04 per cent, moisture content 22.56, 21.77, 20.68, 20.01 and 18.96 per cent and titratable acidity 0.27, 0.31, 0.32, 0.35 and 0.38 per cent. The overall acceptability score of the *burfi* prepared by adding date paste were 7.86, 8.12, 8.42 and 6.71 for 2, 4, 6 and 8 per cent, respectively and that of Control *burfi* was 7.15. The cost of production was higher (Rs. 126.20 per kg) in *burfi*

prepared with 8 per cent date paste, whereas cost of production was lowest for Control T₁ *burfi* (Rs. 122.19 per kg) while, the *burfi* prepared by adding 6 per cent date paste was Rs. 125.37 per kg, which was superiorly accepted by the panel of judges. Hence, taking into consideration both cost and overall acceptability scores, *burfi* prepared by incorporation of 6 per cent date paste was superior over rest of the treatments.

FPT-P-09

UTILIZATION OF MAKHANA (*EURYALE FEROX*) FOR KHEER PREPARATION

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Makhana (*Euryale ferox*) was used for *kheer* preparation with different ratio of cow milk to makhana halves viz., 96:4 (T₁), 94:6 (T₂), 92:8 (T₃) and 90:10 (T₄). The different levels of makhana halves had a significant effect on improving the physico-chemical quality regarding moisture, fat, protein, total solids and ash and sensory quality regarding colour and appearance, flavour, body and texture and overall acceptability of *kheer*. Fat, total solids, protein, moisture ash content were decreased with the increase in level of makhana halves. The sensory evaluation showed that, the *kheer* prepared by adding with 6 part makhana halves (T₂) had secured the highest score (89.74) and ranked as most acceptable treatment. The cost of production of *kheer* was increase with the increase in the level of makhana halves. The cost of production was higher of treatment T₄ with addition of 10 part makhana halves (Rs.127.67 per kg) while, the *kheer* prepared by adding 6 part makhana halves (T₂ treatment) costing Rs. 104.59 per kg which was superiorly accepted by the panel of judges. Hence, it is concluded that best quality makhana *kheer* can be prepared by using 6 part makhana halves which contained 8.29 per cent fat, 35.51 per cent total solids 8.76 per cent protein, 64.48 per cent moisture and 1.27 per cent ash.

FPT-P-10

A PHYSICO-CHEMICAL APPROACH FOR UTILIZATION OF BY-PRODUCT FROM COCONUT INDUSTRY FOR HUMAN CONSUMPTION

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Copra meal flour was physico-chemically characterized to explore possibility of its consumption for human use. Acceptability of copra meal flour for human consumption is directly associated with lack of knowledge about its nutritional facts. Average protein value of copra (23.04%) which is comparatively high to any staple cereal, consumed in India. Higher poly-phenolic compound

(61mg/100gm) owe to its high antioxidative power (89.62µg/gm), restricts the chances of various free radical degenerative diseases. Availability of minerals had the value of 9.139mg/100gm and 4.003mg/100gm for Fe and Zn respectively, proves its status as nutritionally rich. Anti-nutrients in the form of tannin can be eradicated just by soaking it at room temperature overnight (12-16 hr) which reduces it from 2.05% to 0.66%. Color observations for flour shifts it to the darker side owe to its lower L* value with a color difference (ΔE) value of 41.88. Keywords: copra meal, dietary fibre, polyphenols, staple and tannin.

FPT-P-11

EFFECT OF DIFFERENT POST HARVEST TREATMENT ON STORAGE LIFE AND QUALITY OF TOMATO (*LYCOPERSICON ESCULENTUM* MILL) FRUIT

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A study was carried out with the aim of extend shelf life of tomato fruit. The experiment was laid out in completely randomized design with three replications. The treatments consist of LDPE packaging, HDPE packaging and paper packaging with application of various chemicals viz. calcium chloride, salicylic acid, gibberellic acid and chitosan. Treated fruits are kept in ambient and cold storage condition. Significant differences were observed among the physio-chemical parameters due to various post harvest treatments and storage conditions. The tomato fruits kept in LDPE packaging had a significantly low physiologically loss in weight and lycopene content. The highest total soluble solid (TSS) was recorded in control, while recorded lower value of titratable acidity. Treatment of chitosan 1.5 % recorded highest ascorbic acid content and lower ethylene evolution rate and respiration rate thus extended the shelf life of tomato fruits. Among the storage conditions, cold storage maintained significantly higher quality of fruits over ambient storage but chilling injury symptoms were observed at the end of storage period. However, chitosan 1.5 % treated fruits kept under cold storage recorded the extended shelf life of tomato fruits than rest of other treatments. Key words: Shelf life, packaging, storage study, physiological loss in weight, ethylene, respiration.

FPT-P-12

EFFECT OF ENZYME ASSISTED PROCESSING ON ANTIOXIDANT COMPOSITION OF BER JUICE (*ZIZIPHUS MAURITIANA* LAMK)

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Ber (*Ziziphus mauritiana* Lamk) is an excellent

source of several phenolic compounds. The effect of cell wall degradation enzymes, namely pectinase, on the antioxidant composition of ber juice was investigation in the present study. Enzyme assisted processing significantly improved the juice yield, total soluble solids, total phenol and total antioxidants activity (AOX). There was significant increase in recovery of antioxidants, to the tune of 69%, 64% and 43% respectively in ascorbic acid, total phenolics and total flavonoids through pectinase enzyme the in vitro total antioxidant activity of juice extracted via enzyme assisted processing was 19.82 and 13.68 µ mol Trolox/ml in ferric-reducing antioxidant power and cupric-reducing antioxidant capacity assays, respectively. There was 39% increase in AOX of juice extracted with enzyme over straight pressed juice. Results indicated that enzyme-assisted processing can significantly improve the functional properties of the ber juice. Key words: Ber, enzyme, antioxidant composition, processing.

FPT-P-13

STUDIES ON PREPARATION OF FUNCTIONAL (RTS) BEVERAGES FROM KARONDA (*CARRISA CARANDAS* L)

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The investigation were carried out to develop a technology for preparation RTS beverage from karonda juice and study changes in composition and quality of beverages during storage, karonda juice was extracted and analyzed for chemical composition. Preliminary trials were conducted to find out optimum levels of juice and other ingredients for preparing RTS beverage. The RTS beverage prepared with selected level of ingredients was preserved by various treatments at refrigerated ($7\pm 0^{\circ}\text{C}$) and optimum temperatures. The stored beverage samples were evaluated periodically at an interval of 30 days for chemical and sensory properties. Based on sensory properties a fresh RTS beverage containing juice 10 per cent, TSS 10°Brix and acidity 0.30 per cent was found to the best giving highest score over other combinations studied. During the storage of RTS beverage, the total soluble solids, acidity, reducing sugars and total sugars contents increased while ascorbic acid and anthocyanin content decreased. The beverage when stored at refrigerated temperature, exhibited better quality than that stored at room temperature. Key words: RTS, Karonda, chemical composition, sensory evaluation.

FPT-P-14

IMMUNOGLOBULIN ENRICHMENT IN BOVINE COLOSTRUM WHEY POWDER USING ULTRAFILTRATION

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The objective of this study was to prepare the

bovine colostrum whey powder and IgG enriched whey colostrum powder an alternative source of passive immunity for bovine calf, considering newborns consuming non-maternal colostrum. Colostrum-based products are commercially available as a health food supplement and are marketed as a general “health promoting” product, particularly suitable for athletes. The study was conducted on fifteen Karan Fries dairy cows at National Dairy Research Institute, Karnal, India. Bovine colostrum whey powder was prepared from colostrum by renneting and obtained whey was ultrafiltered by using 100 kDa membranes in order to enrich IgG. Colostrum whey and processed ultrafiltrate whey were lyophilized to prepared powder. Lyophilized IgG enriched whey colostrum powder had higher IgG concentration ($P<0.05$) and protein ($P<0.05$) compared to the colostrum whey powder. The high IgG and the protein composition of colostrum whey powder and IgG enriched whey colostrum powder suggests it could be used as a health supplement that helps in the development of immunity in the newborn.

FPT-P-15

EFFECT OF DIFFERENT LEVELS OF KHUS-KHUS PASTE ON CHEMICAL PROPERTIES OF KHEER

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Kheer is an Indian dessert prepared by partially dehydration of whole milk in a karahi over a direct fire together with sugar usually rice or occasionally semolina, shabudana, almond, cardamom and pistachio etc. Looking at the benefit of *kheer* was prepared from buffalo milk blended with sugar, *khus-khus*, rice and cardamom. *kheer* was prepared from different levels of *khus-khus* paste viz. 2, 4 and 6 parts on the basis of buffalo milk. Control *kheer* was prepared using 2.5 parts of rice in buffalo milk. It was observed that moisture content in T_0 and T_1 and T_2 and T_3 significant with each other, whereas T_1 and T_2 was non significant with each other. The fat, protein and ash were highest in T_3 and lowest in T_0 . All the treatment were significant with each other in fat content. In protein content T_0 and T_1 significant with each other, whereas T_1 and T_2 and T_2 and T_3 were no significant with each other. The ash content of *khus-khus kheer* for different treatments was significantly differed from each other. The maximum TS content in T_0 and minimum in T_1 . As the level of *khus-khus* was increases then moisture, fat and protein content were decreases while total solid content was increases.

FPT-P-16

EFFECT OF DIFFERENT LEVELS OF SWEET POTATO PASTE ON ACCEPTABILITY OF KHEER

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Kheer has been known to mankind since times immemorial. *Kheer* is very delicious cereal based indigenous milk product. It is popular throughout the country. In the present study sweet potato *kheer* was prepared from buffalo milk blended with sugar, sweet potato paste as well as rice and cardamom. Sweet potato *kheer* was prepared from different levels of sweet potato paste viz. 2.5, 5.0 and 7.5 per cent on the basis of buffalo milk. Control *kheer* was prepared using 2.5 per cent rice in buffalo milk. The flavour, colour and appearance and body and texture as well as overall acceptability were superior in treatment T_0 whereas inferior in T_3 . While The T_0 and T_1 were non-significant. In case of colour and appearance all treatments were significant with each other. In case of body and texture score there is highest liking was towards *kheer* prepared by 2.5 parts of rice. The overall score of acceptability was treatment T_0 had comparatively highest mean score than the T_1 , T_2 and T_3 .

FPT-P-17

EFFECT OF DIFFERENT LEVELS OF KHUS-KHUS PASTE ON SENSORY PROPERTIES OF KHEER

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Kheer is a nutritious food and characterized by sweet, nutty and pleasant flavour that is highly acceptable. Additionally *khus-khus* has health benefits as presence of oleic acid in poppy seeds reduces the risk of breast cancer while the linoleic acid prevents risk of heart disease, heart attack and stroke. In the present study *khus-khus kheer* was prepared from buffalo milk blended with sugar, *khus-khus* as well as rice and cardamom. *kheer* was prepared from different levels of *khus-khus* paste viz. 2, 4 and 6 parts on the basis of buffalo milk. Control *kheer* was prepared using 2.5 parts of rice in buffalo milk. In present study the flavour score of *khus-khus kheer* for treatment T_0 was significantly superior over all the treatments. In case of colour and appearance score all the treatments were significant with each other and maximum in T_0 and minimum in T_3 . For body and texture score treatment T_0 was significantly superior over treatments T_3 and highest liking was towards the T_0 . The overall acceptability score ranged in between 6.04 to 8.29. Treatment T_0 was

significantly superior over all treatment. T₃ was obtained lowest overall acceptability score i.e. due to increase level of khus-khus which decreased flavour, colour and appearance and body and texture.

FPT-P-18

STUDIES ON THE TEXTURAL PROPERTIES OF FRUIT *BURFI* SOLD IN PARBHANI MARKET OF MARADATHAWA REGION

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Burfi is becoming more and more popular in urban areas. *Burfi* is one of the most popular semi-solid, sweetened *khoa* based sweet prepared from cow or buffalo milk. *khoa* is an important product, which provide a good means of conserving and preserving surplus milk solids. *Khoa* is of greater importance to the confectionaries. *Burfi* have good shelf-life. Several varieties of *burfi* are sold in the market of Maharashtra but in Parbhani city strawberry, mango and fig *burfi* are most popular. For the present study *burfi* sample was evaluated for textural qualities viz., hardness, cohesiveness, adhesiveness, springiness, gumminess and chewiness. Here treatment T₁-Plain *burfi*, T₂-Mango *burfi*, T₃-Fig *burfi* and T₄ Strawberry *burfi*. The result shows that the hardness of sample T₁ was found highest due to higher *khoa* content of *burfi* and lower moisture content of sample compared to other samples. In terms of cohesiveness, T₃ shows superior results with highest cohesiveness among the *burfi* samples. Adhesiveness is lowest for sample T₂ and T₄ while highest for T₁ as well as chewiness and gumminess shows highest values in T₁ while lowest in T₂. On the contrary the springiness shows highest in T₂ compared to that of T₁.

FPT-P-19

EVALUATION OF FRUIT *BURFI* BY USING SENSORY TECHNIQUES IN PARBHANI MARKET

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Burfi is popular milk based confection in India and likely to attain global status. A number of ingredients such as nuts, chocolate, fruits, saffron, pulses, etc. may also be incorporated in *burfi* during the manufacturing process. The nature of additives affects the flavour, body and texture and shelf-life of *burfi*. Several varieties of *burfi* are sold in the market of Maharashtra but in Parbhani city strawberry, mango and fig *burfi* are most popular. The base for all these types of *burfi* is however *khoa* and cane sugar. Here treatment T₁- Plain *burfi*, T₂ - Mango *burfi*, T₃ - Fig *burfi* and T₄ Strawberry *burfi*. For sensory evaluation '9'- point Hedonic scale developed by Quarter Master

Food and Container Institute, USA was used. The result shows that the flavor, colour and appearance and overall acceptability scores of fruit *burfi* is highly significant in treatment T₁ and lowest in T₃. The average scores obtained for body and texture attribute of market samples of *burfi* are differed significantly (P < 0.05). It was maximum in T₄ (8.59) and significantly superior than T₃, T₁ and which was at par with sample T₂ (8.36) respectively.

FPT-P-20

STUDIES ON EFFECT OF CHEMICAL PROPERTIES OF FRUIT *BURFI* SOLD IN PARBHANI MARKET

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Burfi is one of the most popular semi-solid, sweetened *khoa* based sweet prepared from cow or buffalo milk. *Burfi* is indisputable product having economic importance. *Burfi* is expected to have good shelf-life. Several varieties of *burfi* are sold in the market of Maharashtra. In Parbhani city strawberry, mango and fig *burfi* are most popular. The parameters considered for the present study were moisture, fat, protein, ash, carbohydrate and total solids. Here treatment T₁- Plain *burfi*, T₂ - Mango *burfi*, T₃ - Fig *burfi* and T₄ Strawberry *burfi*. The result shows that fat content of market *burfi* ranged between 16.27 to 18.76 and Fig *burfi* (T₃) has highest fat and showed superiority over others. Protein content ranged between 12.22 to 15.97 per cent and highest in T₂ and lowest in T₁ and shows superiority to the other treatments. The treatment T₁ and T₄ are at par with each other. Ash and total solid content was observed highest in treatment T₁ and lowest in T₄. The contrary in moisture content that strawberry *burfi* was significantly superior than others. Highest carbohydrate content was observed in treatment T₁ and lowest in T₂. The values of all parameters were statistically significant (P < 0.05).

FPT-P-21

ADVANCES IN PROCESSING AND PRODUCT DEVELOPMENT OF AONLA (*EMBLICA OFFICINALIS*) IN INDIAN CONTEXT- A REVIEW

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Aonla is an important fruit crop indigenous to Indian sub-continent, which can be grown successfully in dry and

neglected regions in the minimum management input. The area under aonla has been expanding rapidly in the last couple of years. Aonla is one of the oldest Indian fruits and considered as “*Wonder fruit for health*” because of its unique qualities. It is having high context of Vitamin C and comparable to only that of Barbados cherry (*Malpighia glabra L.*). The fruit is used as an antiscorvic, diuretic and laxative, hence used for treating common cold, gastric troubles, acidity and scurvy, dysentery and bronchitis, diabetes, diarrhoea, jaundice and dyspepsia and coughs, asthma, headache, ophthalmic disorders, colic, flatulence, skin diseases, leprosy, and greyness of hair etc. It has great potential in processed forms, which can have great demand in national as well as international market. Lot of work has been made in processing and product development in this fruit. Majority of products are sugar based and they have very little scope for export and for domestic use, the trend is changing and the demand for new novel products is increasing. An attempt has been made in this paper to compile all the information on various products development from aonla and future prospectus for processing and value addition. The present investigation was carried out to develop processing techniques for making different Aonla products such as Jam, Jelly, Squash, Juice, Candy, Supari, Powder, Biscuit, Chutney, Chayavanprash, Instant Juice and Soup mixes, Ladoo, Mouth freshener, Nectars, Oil, Pickle, Preserve, Sauce, Shred, Sweet Aonla Flakes, Syrup, Toffee, Triphala and so on which can be used at domestic and for commercial scale.

FPT-P-22

MICROENCAPSULATION TECHNIQUES APPLICABLE TO FOOD FLAVOURS RESEARCH AND DEVELOPMENT: A COMPREHENSIVE REVIEW

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This systematic review sought to determine the current state of the literature on the microencapsulation of flavours. Different wall matrix materials and flavours encapsulated by different techniques are discussed in detail. Though no classification of methods used for microencapsulation is perfect even then an effort has been made to classify the methods between physical processes and chemical processes. The advantages and disadvantages of both types of methods is being highlighted. A future application of microencapsulation process is highlighted for various flavours. Keywords: Microencapsulation, Microcapsule, Encapsulation, Flavours, Coacervation.

FPT-P-23

RECENT ADVANCES AND APPLICATIONS OF SUPERCRITICAL FLUID EXTRACTION IN FOOD PROCESSING

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The increased consumer acceptance for functional and nutraceutical foods leads to development of new technique for obtaining high value functional components. Increasing public awareness of health, environment and safety hazards associated with the use of organic solvents in food processing and the possible solvent contamination of the final product as well as high cost of organic solvents and legislative regulations have pointed out the need for the development of new, economical, clean, viable and suitable for several types of solid matrixes. SFE (super critical fluid extraction) technology has replaced conventional extraction techniques and minimizes the disadvantages of conventional thermal methods and destruction of valuable substances. Many researchers studied SFE with focus on functional foods and extraction of nutraceuticals, essential oils, polyphenolic compounds etc for their bioactiveness. This article covers reviews on recent advances and various applications of SFE in food industries regarding extraction parameters, use of co-solvents or modifiers, effect on yield and also other applications of SFE for routine food analysis. Keywords: SFE, Supercritical fluid extraction, Food.

FPT-P-24

MULTI-NUTRIENT BISCUITS FOR RURAL CHILDREN: TEXTURE ANALYSIS AND COLOUR EVALUATION

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Multi-nutrient biscuits were made from two types of composite flours viz Composite flour I (CF I) contained Corn flour, Wheat flour, Malted Ragi powder, sprouted Green Gram powder, Soy Protein isolate, Dairy whitener, Roasted peanut powder and Papaya powder in set ratios whereas Composite flour II (CF II) contained Jowar flour and green gram powder instead of malted ragi and sprouted green gram respectively. The dough used for biscuit making was analysed for its hardness, stickiness and cohesiveness. The biscuits made were evaluated for its cutting strength, hardness and colour and the results were compared with control refined wheat flour biscuits. Dough hardness, measured in terms of force required to penetrate cylindrical probe was found to be statistically less ($P \leq 0.05$) for both CFs dough's as compared to control dough similarly dough stickiness and cohesiveness was also less for CFs flour indicating a weaker gluten network as compared to control dough which resulted in lower cutting

strength of the corresponding biscuits which is desirable. Hardness of biscuits as measured by snap test was higher for both CFs biscuits (CF I: 17.22N and CF II: 16.87N) as compared to control biscuits (15N) due to the high protein content of CFs. The L* value of both CFs biscuits were lower than control biscuits indicating darker colour due to maillard reaction between reducing sugars and amino acids found in abundance in CFs which in turn affected the a* and b* values. CF I samples were darker in colour as compared to CF II samples due to ragi present in CFI making them less acceptable than CFII biscuits but both types of biscuits were more acceptable than control biscuits. Thus textural and colour analysis indicated that both types of biscuits were either at par and superior to conventional refined wheat flour biscuits.

FPT-P-25

STUDIES ON PREPARATION AND QUALITY EVALUATION OF HEALTH FOOD FROM FINGER MILLET MALT

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Finger millet is minor millet, rich source of minerals specially calcium (344 mg/100g); it is also good source of protein and calorie. It contains some anti-nutritional factors which can be effectively reduced by malting. Processed finger millet may help in reducing or managing the disease risk. In view of above there was a need felt to study health food (HF) which can easily formulated using simple processing techniques and also provides health benefits to consumers. Finger Millet Malt (FMM) obtained by using standardized malting process. HF samples are prepared using varied per cent of malt (30, 40, 50 and 60gm). Attempts have been made to study the nutritional value of finger millet and HF along with sensory quality evaluation. Results obtain indicated that HF prepared with 50% FMM was scored highest in over all acceptability with acceptable nutritive value especially mineral, protein, carbohydrate. Thus it can be concluded that prepared HF Can be utilized by all age group people which can be helpful in minimizing or reducing disease risk or to support body functions, especially concerned with mineral and protein-calorie deficiency disorders.

TECHNICAL SESSION - III

THERAPEUTIC NUTRITION AND HEALTH CARE (THC)

THC-O-01

SERUM B12 STATUS AMONGST TYPE 2 DIABETES MELLITUS ADULTS ON METFORMIN

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Based on the results of adults on metformin, 5.8–33% has evidence of reduced vitamin B₁₂ absorption. No guidelines of standard care for B₁₂ screening and treating low B₁₂ levels in Type 2 Diabetes Mellitus (T2DM) adults exists. The objective of this study was to determine the prevalence of B₁₂ deficiency in T2DM adults and to understand its implications in management of T2DM. 144 metformin treated T2DM adults were assessed for nutritional status and biophysical measurements. Of 144 patients, 75 had vitamin B₁₂, Hb1Ac and Hemoglobin with cell morphology done. A case control design was employed using two groups (B₁₂<200pg/dl and B₁₂>200pg/dl). Vitamin B₁₂ deficiency (<200pg/ml) was recorded in one third (36%) of the adults. B₁₂ deficiency was more among females (77%); majority (30%) with very low (<150pg/ml) B₁₂. None showed macrocytic anemia. One-fourth (38%) reported anorexia and metallic taste as metformin side effects (p<0.05). Of 27 B₁₂ deficient adults only 18% had euglycaemia (Hb1Ac<7%); fundamental to prevent microvascular and neuropathic complications. B₁₂ deficient T2DM adults are more likely to have poor glycemic control and metformin side effects like anorexia and metallic taste, potentially leading to difficulties for dietary compliance; a corner stone in improving glycemic control and thereby reducing the risk of neuropathies. B₁₂ deficiency seems crucial as regards metformin side effects and glycemic control.

THC-O-02

OSTEOGENIC NATURE OF CISSUS QUADRANGULARIS

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Cissus Quadrangularis (CQ), is also known as the "Bone Setter" and considered as a unique bone-building medicinal herb. It is a succulent climber, belonging to the family Vitaceae and widely distributed throughout India particularly in tropical regions. A phytochemical isolated steroid is believed to be the main constituent in CQ that is responsible for its bone healing

property. It is a rich source of carotenoids, phytosteroids, flavonoids, phenolic compounds, ascorbic acid and calcium. These components have a potent metabolic and physiological effect that aids in bone cell proliferation, differentiation, metabolism and apoptosis. The scrutiny of literature revealed some other notable pharmacological activities of the plant such as antioxidant, free radical scavenging, anti-microbial, anti-bacterial, anti-ulcer, analgesic, anti-inflammatory and diuretic, the plant can be potentially used either in pharmaceuticals or as an agriculture. Recently, it has been shown that the petroleum ether extract of CQ enhances fetal bone growth and ossification too. The present review is an attempt to highlight phytochemicals, various traditional uses as well as pharmacological reports on *Cissusquadrangularis* L. Key Words: *Cissusquadrangularis*, Phytosteroids and Ossification.

THC-O-03

INNOVATIVE METALLIC SALTS THAT HAVE CLINICAL POTENTIAL TO RESOLVE HEALTH PROBLEMS WHICH INVOLVE VARIOUS LEVELS OF DEFICIENCIES OF METALS IN ANIMAL BODY

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A health problem develops under the influence of a disease causing factor, due to depletion of specific kind of cellular metal/ metals from a particular cell system. Depletion of a cellular metal in an animal body is linked to (i) Degradation in operation level of some physiological functions due to decline in nutritional, metabolic, enzyme activities and immunological levels. (ii) Becoming of cell system prone to invasion of infection, related to nature and level of deficiency of depleted cellular metal/ metals. (iii) Modification in level of body energies. (iv) Altered level of body fluids pH. (v) Development of a health problem related to nature and level of deficiency of the cellular metal/ metals. (vi) Developed abnormality in structure and function of the cell. Management of a health problem requires restoration of normalcy in concentration levels of depleted cellular metals through oral administration of their suitable salts. Natures of deficient cellular metals are identified by conducting elemental analysis of biopsy material that may be collected on random basis and analyzed using a suitable analytical technique. Metallic salts for clinical use are prepared by vapor-phase reactions between metals oxide and ammonium chloride. After *vitro-vivo* study, a metallic salt is able to resolve alone health problems that involve various levels of deficiencies of the metal in animal body. Keyword: Health problems, Metallic drugs, Management

THC-O-04

INVOLVEMENT OF BODY FLUIDS PH LEVEL IN THE ONSET AND CLINICAL MANAGEMENT OF ANIMAL HEALTH PROBLEMS

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Hyper-acidity influence specific cell system related to chemical nature and Concentrations level of acid in hyper state that initiates disease process. Abnormal level of a cellular fluids pH is managed within their normal limits through release specific kind of cellular metals from body stores that depletes. Developed hyper acidity is associated with the release of specific signs and symptoms of a disease due to functional abnormality developed in regulatory mechanisms that fail to get requisite amount of depleted cellular metals. When depleted cellular metal acquire deficient state a disease fully develops. Hyper level of an acid affects different kinds of cells. Each one related to its specific level of deficiency and leads to development of a particular disease that involve depletion of specific cellular metals. Deficiency of a cellular metal render cell (i) nutritionally deficient and prone to the invasion of infection (ii) structurally and functionally abnormal (iii) physiologically degraded. Nature of health problems depends upon (a) chemical nature and concentration level of acid in hyper state (b) chemical nature of depleted cellular metal (c) nature of cell system involve in the disease process. Management of a health problem requires restoration of normalcy in abnormal level of body fluids pH through oral administration of suitable salt of cellular metals that deplete during onset of the disease. Nature of depleted cellular metals are identified by conducting elemental analysis of biopsy material (scalp hair/ blood cerium) that may be collected on random basis and analyzed through use of a suitable analytical technique. Keyword: pH level, cellular metal, disease, management.

THC-O-05

ANTIDIABETIC EFFECT OF CASSIA FISTULA BARK POWDER AMONG SELECTED TYPE 2 DIABETES

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Diabetes has become a major global threat to humans and its costs to society are high and escalating forcing people to find alternative therapy with fewer side effects than that of the commercial drugs. Medicinal herbs, long used in alternative medicine system are extremely rich sources of type 2 diabetes remedies. The use of herbs is also substantiated by WHO. *Cassia fistula* [family-caesalpiniaceae] also known as Indian Laburnum is a medicinal plant having hypoglycemic property. This plant

is used in folk, ayurvedic and unani medicine to treat constipation, skin diseases, diabetes and cardiopathy. This study was carried out to find the antidiabetic action of the stem bark powder of *Cassia fistula* to selected type 2 diabetes. **Methodology** - Twenty male subjects with type 2 diabetes who fulfilled the selection criteria were selected randomly and equally grouped as experimental and control group. Three grams of *Cassia fistula* bark powder was supplemented to the experimental group for a period of 45 days with the approval of Institutional Human Ethical Committee. Biochemical tests such as fasting, postprandial blood sugar, HbA1c and lipid profile were estimated every 15 days during the study period for both control and experimental groups and results were analyzed statistically. **Results** - The mean fasting and postprandial blood sugar level in the experimental group reduced from 153.50±11.157 to 120±9.07 and 235.50±32.524 to 206±30.67 respectively which was significant at 5% level. The mean total cholesterol level also reduced from 227.6±30.855 to 207.6±9.99 at 5% level significance. The bark powder of *Cassia fistula* was found to be very effective in controlling blood sugar level of diabetes and proved its importance as a valuable medicinal plant.

THC-O-06

DEVELOPMENT OF LOW GLYCEMIC INDEX GREEN GRAM HUSK INCORPORATED FIBER RICH FOOD PRODUCTS AND THEIR INTERVENTION FOR HEALTH BENEFITS

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Dietary fiber is steadily gaining importance in human diet. Beneficial effects of dietary fiber have been attributed to its role in modifying some of the physiological activities in the body. It is used as mild laxative and also useful in the prevention and treatment of chronic diseases such as coronary heart diseases, obesity, diabetes and certain cancers. Pulse husk is a major by-product of *dal* mills which is basically used as ruminant feed. Its nutritional significance in human diet is less known. Keeping in view that pulse husk is a rich source of dietary fiber, the present study was undertaken to incorporate green gram husk in food items. The husk was incorporated in traditional recipes i.e. plain and misi roti in varying proportions (5-15 per cent) and the acceptability of the products was tested for different sensory qualities. Most acceptable product i.e. 15% husk incorporated *misi parantha* was evaluated for various nutritional parameters and glycemic index. *Misi parantha* with 15 per cent green gram husk incorporation contained 17.5 % moisture, 15.31 % crude protein, 8.88 % crude fat, 4.0 % crude fiber, 51.7 % available carbohydrate, 347.96kcal calorific value, 2.61 % total ash, 146.66mg calcium/100g, 436.66mg phosphorus/100g, 41.14mg iron/100g, 3.35mg zinc/100g, 0.47mg copper/100g, 2.88mg manganese/ 100g, 3.89mg niacin/100g, 18.18 % insoluble dietary fiber and 2.65 % of soluble dietary fiber. Ionizable and soluble iron was found to be 1.91 and 1.18mg/100g respectively with the in-vitro iron bioavailability as 1.37 %. The GI of fiber rich *parantha*

was found to be lower i.e. 32.54 in comparison to control *parantha* suggesting its suitability in diabetic diet. For the experimental study, a total of 30 constipated subjects were selected comprising of both males and females between the age group of 30-60 years. Information regarding general information, diet history, anthropometry and physical fitness, work pattern and medical history of the subjects was collected using a presurvey proforma. Out of 30, ten experimental subjects suffering from constipation were selected for the intervention study and they were provided with fiber rich pre mix (15 per cent green gram husk incorporated with wheat flour) regularly for 45 days and improvement in signs and symptoms was recorded through post survey proforma every 7th day from the day of start of study which showed a significant effect in the alleviation of signs and symptoms of constipation. A significant decrease in mean total blood cholesterol level of subjects was seen after a period of 45 days. Mean body weight and fasting blood glucose level of the subjects were decreased in 45 days although the decrease was non-significant.

THC-O-07

AN INVERSE ASSOCIATION OF MATERNAL MICRONUTRIENTS (FOLIC ACID, VITAMIN B₁₂ AND OMEGA-3 FATTY ACIDS) WITH PLASMA AT1-AA LEVELS DURING PREGNANCY

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Poor maternal nutrition has been shown to be associated with adverse pregnancy outcome such as preeclampsia (PE). PE is a pregnancy-associated disorder characterised by new-onset of hypertension and proteinuria. Angiotensin II type 1 receptor autoantibodies (AT1-AA) have been shown to inhibit trophoblast migration and induce PE-like symptoms thereby contributing to the pathophysiology of PE. The present study examines the associations between consumption of foods rich in nutrients like vitamin B₁₂, folate and omega-3 fatty acids with plasma level of AT1-AA. AT1-AA levels were measured from maternal plasma [at 16–20 weeks (T1), 26–30 weeks (T2) and at delivery (T3)] and cord plasma by ELISA on 46 normotensive control (NC) women and 35 women with PE. A food frequency questionnaire was used to estimate the frequency of consumption of different foods rich in folate, vitamin B₁₂ and omega-3 fatty acids at three time points. Maternal plasma AT1-AA levels were higher at T2 (p<0.05) in women with PE as compared to NC. Cord plasma AT1-AA levels were higher (p<0.05) in women with PE as compared to NC. There was a negative association between maternal AT1-AA levels and frequency of consumption of foods rich in vitamin B₁₂, folate, alpha linolenic acid (ALA), DHA and omega-3 fatty acids in the whole cohort at T1 and with DHA at T3. This study shows the association of vital micronutrients and omega-3 fatty acids with AT1-AA from early pregnancy, suggesting that

nutritional intervention in early pregnancy may lead to better pregnancy outcome.

THC-O-08

MATERNAL OMEGA-3 FATTY ACID SUPPLEMENTATION TO A HIGH FAT DIET NORMALIZES DAM OXIDATIVE STRESS LEVELS AND INCREASES PLACENTAL OMEGA 3 FATTY ACID LEVELS

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The Developmental Origins of Health and Disease hypothesis states that under and over nutrition during the developmental period have detrimental effects on the health of the offspring. In developing countries like India, there is excess consumption of saturated fats and low consumption of omega-3 fatty acids. Increased consumption of high fat diets may program the offspring for developing non-communicable diseases in later life. The present study investigates the effects of omega-3 fatty acid supplementation to maternal high fat diet on placental fatty acid levels and oxidative stress. Pregnant wistar rats were divided into 3 dietary groups (n=8). Control, High Fat diet (HFD), high fat diet+omega-3 fatty acids (HFDO). Dams were dissected on d20 of gestation. Placental fatty acids were analyzed using Gas Chromatography. Plasma malondialdehyde levels were measured using Bioxytech MDA-586 kit. Placental DHA levels were lower ($p < 0.01$) while oxidative stress was higher ($p < 0.05$) in the HFD group as compared to the control group. Omega 3 fatty acid supplementation to the high fat diet normalizes the oxidative stress and increases ($p < 0.05$) the levels of placental omega 3 fatty acids. This data may have implications for reducing the risk of non communicable diseases in off spring in later life through maternal omega-3 supplementation.

THC-O-09

AN ANALYSIS OF THE EFFECT OF DRUMSTICK LEAF POWDER (*MORINGA OLEIFERA*) AMONG HYPERLIPIDEMIC AND HYPERTENSIVE SUBJECTS

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Moringa oleifera is a highly valued plant, distributed in many countries of the tropics and subtropics. The leaves of this plant contain a profile of important minerals, and are a good source of protein, vitamins, and phytochemicals. It has an impressive range of medicinal uses with high nutritional value. Drumstick leaves possess, antihypertensive, cholesterol lowering, antitumor, antipyretic, anti-inflammatory, antiulcer, antispasmodic,

diuretic, , antioxidant, antidiabetic, hepatoprotective, antibacterial and antifungal activities. Drumstick leaves can be consumed either fresh, cooked or in a dried powder form without nutritional loss. The present study is an attempt to analyse the effect of supplementation of drumstick leaf powder among hyperlipidemic and hypertensive subjects. Twenty subjects with hyperlipidemia and hypertension between 50 – 65 years were selected for the study. They were divided into two groups. Experimental Group (EG=10) and Control Group (CG=10). The experimental group was supplemented with 8 gm of dried drumstick leaf powder along with lunch for a period of 45 days. Clinical parameters of lipid profile was observed every 15 days and blood pressure was recorded every 5 days for the EG during the experimental period. The supplementation of drumstick leaf powder showed effective lowering of total cholesterol from 240 mg/100dl to 190 mg/100dl and blood pressure, systolic from 170 mm Hg to 128 mm Hg and diastolic from 110 mm Hg to 89 mm Hg. This proves the therapeutic values of drumstick leaf powder which can be advocated for regular consumption as a preventive measure, as well as a therapeutic supplement. Key words: Drumstick leaf powder, hyperlipidemia, hypertension, phytochemicals.

THC-O-10

ROLE OF NUTRIENTS IN ANIMAL PHYSIOLOGY AND THEIR CLINICAL EFFECTS DURING MANAGEMENT OF A HEALTH PROBLEM WITH SPECIAL REFERENCE TO DIABETES

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Nutrients are dietary chemicals that are required in specific concentrations to supply required amount of energy for body health and activities. Nutritional status depends on their nature and relative concentration of nutrients in body. An inadequate concentration of a nutrient turns body nutritionally deficient in specific cell system that suffers with (I) Change in cellular fluids pH level. (ii) Development of structural and dysfunctional abnormality. (iii) Modification in rate of synthesis, export and cause of action of synthesized biochemical. (iv) Alteration in immune response (cell-mediated -immunity). Nutrients exhibit metabolic inter dependence i.e. inadequate concentration of a nutrient render other nutrients partially metabolized that in due course develops health problems. Nature of health problems depends not only on the nature deficient nutrient but also on level of partially metabolized nutrient in body fluid. Hyper glycaemia develops due to (a) deficiency of specific kinds of cellular metals. (b) Abnormal characteristics of synthesized insulin in pancreatic cell due to developed nutritional deficiency in them. Deficient cellular metals are identified in biopsy material (scalp hair/blood serum) that may be collected on random basis and analyzed through a suitable analytical technique. Management of hyper glycaemia requires restoration of normalcy in abnormal nutritional status through oral administration of suitable

salts of deficient cellular metals during treatment that tends to (i) normalize abnormal level of body fluid pH. (ii) Improve level of carbohydrate metabolism. (iii) Keeps unmetabolized sugar level within normal limits. Key word: Nutrients, health problems, management.

THC-O-11

TOTAL OXALATE AND FLAVONOIDS CONTENTS IN SELECTED PLANTS

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Total oxalate (on DMB) in banj (oak) and kharsu (oak) leaves was found to vary between 2.10-3.35% and 1.54-2.67% respectively. Highest level of oxalate in banj and kharsu leaves was observed during April (3.30-3.35%) and January (2.64-2.67%) months respectively. Oxalate contents were found to be 2.04-2.93% in chlorophytum roots. Preliminary investigations revealed highest flavonoids content in kharsu (23.35mg/g) followed by banj (18.93mg/g) and bun (oak; 16.80mg/g) leaves. Highest antioxidant activity was observed in kharsu leaves and lowest in bun leaves. Flavonoids content in tea seeds powder were found to be 3.64mg/g. It was concluded that some of these plants can be regarded as promising candidates for natural sources of antioxidants with high value.

THC-O-12

IMPACT OF FOOD SUPPLEMENTATION ON THE NUTRITIONAL STATUS OF MODERATE AND SEVERELY UNDERNOURISHED GIRLS OF RURAL PRIMARY SCHOOLS OF VADODARA, GUJARAT, INDIA

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Malnutrition is a persisting problem seen amongst the school children despite the ongoing mid day meal program. The present study aimed to study the impact of three different food supplements on the nutritional status of the moderate and severely thin girls of four rural schools of Vadodara. The anthropometric screening of 826 girls studying in 1st - 8th standard revealed a high prevalence of moderate and severe undernutrition. The impact of supplementation was carried out for a period of 45 days. One school served as the control (School 1) and in the other three schools the supplementation of three different food supplements was carried out viz. Sukhdi (School 2), Bengal gram + Jaggery (School 3) and Groundnut + Jaggery (School 4). The results showed a non-significant increase in the weight, height and BMI of the moderate and severely thin girls in School 2 and School 3 which was higher than observed in the control

school. A significant increase in the weight, height and BMI was seen in the moderate and severely thin girls in School 4. No significant changes were seen in the control and School 2. There was a 15.52%, 25.43% and 18% in percent prevalence of severe underweight in School 2, School 3 and School 4. A decrease in the percent prevalence of anemia by 13.33% and 6.45% was seen in School 2 and School 4 respectively. There was no major change observed in the physical work capacity of the girls. Thus, the study highlights that calorie and protein dense food supplement in addition to MDM can help to improve the nutritional status of the adolescent school girls.

THC-O-13

THE BURGEONING BURDEN OF HYPERTENSION IN A MIDDLE AGED INDIAN POPULATION ATTENDING A HEALTH CHECKUP FACILITY IN AHMEDABAD, GUJARAT

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Among the major health transitions witnessed in the second half of the twentieth century, the most globally pervasive change has been the rising burden of non-communicable diseases. The present study was designed with an objective to assess the risk of cardio-metabolic aberrations among adult subjects attending the Out Patient Department of Jivraj Mehta Smarak Foundation Hospital in Ahmedabad. A total of 422 subjects (209 Males and 213 females) were enrolled and information on their socioeconomic background, diet & lifestyle practices and anthropometric, biophysical and biochemical parameters was collected. Hypertension (32.2%) followed by hyperlipidemia (15.9%) was the most prevalent clinical condition among the subjects. Based on the JNC VII criteria for diagnosis of hypertension, 46.5 % and 22.2% subjects were newly diagnosed as pre-hypertensives and confirmed hypertensives respectively. Around 17.8% of the hypertensive subjects had confirmed diabetes and another 32.6% had pre-diabetes. A high prevalence of prehypertension (44.7%) in young adulthood (20 – 30 years) is a matter of concern. The presence of prehypertension or hypertension in subjects significantly raised the FBS levels as compared to subjects with normal blood pressure. The predictor variables for hypertension were BMI, Waist-Stature Ratio (WSR), diabetes, LDL and total cholesterol. Thus, there is a need to monitor the population with simple, non-invasive, cost-effective anthropometric tools such as Waist-Hip Ratio and WSR on a routine basis to identify at-risk subjects.

THC-O-14

EFFECT OF SOXHLET AND ULTRASOUND ASSISTED EXTRACTION ON ANTIOXIDANT ACTIVITY OF POMEGRANATE PEEL EXTRACT

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Pomegranate (*Punica granatum* L.) peel of 'Bhagwa' variety were subjected to extraction using different solvent viz. MeOH and DI water by ultrasound assisted extraction (UAE) and soxhlet assisted extraction (SAE). Bioactive compound of pomegranate peel extracted by UAE show higher yield 51% (60°C, 40 min and 40 kHz) as compare to the yield 39.4% obtained by SAE method. The total phenolic contents (TPC) of extract varied from 1.81 to 3.96 and 2.43 to 4.45 mg gallic acid equivalent (GAE) / g in SAE and UAE respectively. The DPPH scavenging activity of extract varied from 15 to 56% and 51.84 to 67.94% inhibition, in SAE and UAE respectively. The FRAP value varied from 693.42 to 799.82 mg ferrous sulphate equivalent (FSE) / g and 763.73 to 832.17 mg FSE / g, in SAE and UAE respectively. HPLC was used for the quantification of polyphenol in PPP extract, chlorogenic acid present in highest quantity (1444.03ppm in UAE as compare to 399.72ppm in SAE). The present research showed that UAE can be used for highest extract yield and which showed highest antioxidant activity as compare to SAE. On the other side UAE prevent the degradation of the bioactive compound.

THC -O-15

EVALUATION OF UNDERUTILIZED VEGETABLE LEAVES AS A POTENT SOURCE OF DIETARY ANTIOXIDANT AND ANTIMICROBIAL AGENT

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The present study evaluated the antioxidant and antimicrobial potential of four under- utilized vegetable leaves namely carrot (*Daucus carota* (DC)), beet (*Beta vulgaris* (BV)), cauliflower (*Brassica oleracea* (BO)) and radish (*Raphanus sativus* (RS)). The Total Phenolic Content (TPC), Total Flavonoid Content (TFC) and Total Reducing Power (TRP) were evaluated for the methanolic extract of leaves. DPPH radical scavenging activity, ABTS radical cation scavenging assay, hydroxyl radical (OH) scavenging activity, superoxide radical scavenging activity and antioxidant activity in linoleic acid emulsion system were carried out for the methanolic extracts of the samples to assess the *in*

vitro antioxidant activities. The results showed that there exist a linear correlation between polyphenol content and antioxidant property. The methanolic extract of DC showed the highest phenolic content (34.2 mg GAE/g), DPPH radical scavenging activity (IC₅₀ -32.5 µg/ml), ABTS radical scavenging activity (TEAC value - 46.47 µg/ml) and hydroxyl radical scavenging activity (IC₅₀ - 214.3 µg/ml). In addition to *in vitro* antioxidant activity, all the methanolic extract of these underutilized leaves possessed potent antimicrobial activity against many human pathogens. Key words: Underutilized leaves, antioxidant, antimicrobial potential, pathogens.

THC-O-16

EVALUATION OF ANTIOXIDANT PROPERTIES IN FUNCTIONAL BEVERAGES DEVELOPED FROM EXOTIC FRUITS ACEROLA (*MALPIGHIA EMARGINATA*) & BER (*ZIZYPHUS MAURITIANA* L)

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India has many exotic fruits namely acerola, ber, anola, wood apple, phalsa etc., which are rich in ascorbic acid, polyphenols, flavonoids and exhibit good antioxidant properties. Hence our study focused to develop functional drinks from exotic, underutilized, seasonal and antioxidant/bioactive compound rich fruits. Among these acerola has potent ascorbic acid content in fresh as well as processed product. Similarly ber also contains fair source of ascorbic acids and good source of phenolics including caffeic acid, p-hydroxybenzoic acid, ferulic acid and p-coumaric acid. Preparation of functional drinks (fruit squash and RTS drink) from acerola and Ber respectively using standard procedure. Antioxidant properties of acerola and its squash; ber and RTS Ber drink were estimated using DPPH, Reducing power assay, total phenolic and total flavonoid content method. The results indicate that acerola fruit has relatively highest DPPH activity (89.12±0.42% % inhibition), reducing power, (3.05abs), total phenolics (809.1µg pyrocatechol equivalent) and total flavonoids (471µg rutin equivalent) than acerola squash (88.18% inhibition, 1.8abs, 168.0µg pyrocatechol equivalent, 3.2µg rutin equivalent) respectively. Ber fruits has highest DPPH activity (78.37% inhibition), reducing power, (3.5abs), total phenolics (94.7.1 µg pyrocatechol equivalent) and total flavonoids (7.2µg rutin equivalent) than RTS ber drink (69.76% inhibition, 1.2abs, 18.50µg pyrocatechol equivalent, 2.78µg rutin equivalent) respectively. Acerola and ber functional beverages retain much of antioxidant properties after processing as reported in the results. Both the fruits have special characteristics in terms of colour, flavour and taste. Acerola squash retains most of colour and acid taste, no synthetic colour was added and serves as 'clean label'. Hence these functional beverages can be used as a solution for replacement of many calorie loaded and unhealthy beverages.

THC-O-17

ANTIOXIDANT POTENTIAL OF ORANGE PEEL POWDER IN GHEE AT ACCELERATED STORAGE TEMPERATURE

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A study on an antioxidant potential of orange peel powder in ghee was investigated. On the basis of preliminary sensory study orange peel powder (1, 1.5 and 2%) was added in to butter and prepared ghee. Ghee with BHA (0.02%) and control were prepared for comparison study. Peroxide value (PV), thiobarbuturic acid (TBA) and free fatty acid content (FFA) of ghee samples stored at accelerated temperature (60°C±2) were analyzed. PV, TBA and FFA were observed to increase in all the samples with highest in the control. The sample treated with 2% orange peel powder found to be least increase in PV (0.3192 millimoles of O₂/g of fat) and FFA (0.4821 % oleic acid) while the sample treated with BHA was observed with lowest TBA value (0.089) at the end of storage. The sensory data revealed that all the treated samples were in acceptable range and liked very much by panelist with sensory score of slightly above 8 and the score was close to control. The experimental data revealed that orange peel has got antioxidant potential and orange peel powder may be added to ghee as natural antioxidant for reducing oxidative deterioration of fat in ghee.

THC-O-18

ANALYSIS OF STEM OF *TINOSPORA CORDIFOLIA*, LEAVES OF *ANDROGRAPHIS PANICULATA* AND ROOT & LEAVES OF *BOERHAAVIA DIFFUSA* FOR NUTRITIONAL AND PHYTOCHEMICAL COMPOSITION

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Medicinal plants found diverse use in the society from medicine to cosmetics and herbal foods as they have vast potential for their curative medicinal uses. In view of this, the fresh stem of *Tinospora cordifolia*, leaves of *Andrographis paniculata* and roots and leaves of *Boerhaavia diffusa* were evaluated for nutritional and phytochemical compositions. The results showed that the leaves were found to be richer in vitamin C and minerals as compared to stem and root parts, while stem and root samples were found to be rich in fibre content. Berberine content (0.03294 %) in *T. cordifolia* and andrographolide (1.8 %) in *A. paniculata* were found to be high. The leaves of *B. diffusa* were found to be richer in percent radical scavenging activity (24.32 %) as compared to *T. cordifolia* stem

(21.72 %) and *A. paniculata* leaves (23.56 %). *B. diffusa* leaves were found to be richest source of phytochemicals and percent radical scavenging activity among the parts analyzed, except saponins. The nutrient compositions obtained from the analysis suggested that these plant parts are a good source of antioxidants, vitamin and macro-and micro-nutrients make them strongly suitable to be incorporated into human nutrition. Keywords: *Boerhaavia diffusa*, *Andrographis paniculata*, proximate and chemical compositions.

THC-O-19

EFFECT OF PROCESSING METHODS ON THE NUTRACEUTICAL AND ANTIOXIDANT PROPERTIES OF RED RICE (*ORYZA NIVARA*)

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The effect of roasting, microwave cooking, pressure cooking/autoclaving on the nutraceutical and antioxidant properties of red rice (*Oryza nivara*) was investigated. The nutraceutical properties were determined by evaluating the total phenolic, flavonoid and phytic acid contents while the antioxidant properties were studied by the DPPH free radical scavenging activity and the iron reducing power assay. The results showed that the total phenolic and flavonoid of processed red rice increased, while phytic acid content was decreased when compared to native sample. The DPPH radical scavenging activity and the iron reducing power of roasted red rice extract were the highest compared to the other processed red rice. A significant increase in TPC, FRAP, reducing power and DPPH content was found in all the selected cereals while decrease in TFC was observed after microwave & roasting. The roasted flour exhibits higher AOA than microwave treated flour. The results indicate that processing has significant effects on the nutraceutical and antioxidant properties of selected cereals. Keywords: Red rice, pressure cooking, Microwave treatment, Steaming, Roasting, Nutraceutical, Antioxidant

THC-P-01

DIETARY PATTERN AND LIFESTYLE OF PATIENTS SUFFERING FROM DIABETES WITH RENAL COMPLICATIONS

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The present entitled "Dietary Pattern and Lifestyle of Patients Suffering from Diabetes with Renal Complications" was carried out with the following objectives, to determine dietary pattern and nutritional status of patients of diabetes with renal complications and the clinical and biochemical parameters of the respondents.

Urban area of Allahabad was selected purposively for the study because of its convenience and good access to the area. Hence, regular visits could be made for authentic collection of data. Total one hundred twenty respondents were purposively selected from Nazareth Hospital and Swaroop Rani Hospital, and they are personally interviewed with the help of pretested interview schedule by visiting the study area (Nazareth Hospital and Swaroop Rani Hospital). The anthropometric measurements of the respondent's i.e. height in cm and weight in kg are taken. Dietary intake was determined by the twenty four hour dietary recall method and the average nutrient was calculated by using the food frequency consumption tables and compared with RDA. Biochemical parameter was collected from recent investigation reports of the respondents. To figure out all the observations on the basis of findings it is concluded that 69.19 percent respondents was non-vegetarian and the average intake of major nutrient i.e. energy, protein, thiamine and iron was less than the RDA given by ICMR. Respondents biochemical profiles FBS, PPBS, Serum Urea, Serum Creatinine, Serum Albumin level was higher than normal range.

THC-P-02

POTENTIAL ROLE OF CINNAMON IN MANAGEMENT OF TYPE 2 DIABETES MELLITUS – A REVIEW

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Diabetes is a chronic disorder of glucose metabolism resulting from dysfunction of pancreatic beta cells and insulin resistance. It is still a serious global health problem leading to a number of associated co morbidities. India has a primary position in the global diabetes epidemiology map as it is the home of nearly 33 million diabetic subjects which is the highest number in the world. A number of spices and herbs have a long history of traditional use in treating elevated blood sugar levels. One such compound that has recently been the subject of intense research is Cinnamon, a compound granted GRAS (Generally Recognized as Safe) status by the United States Food and Drug Administration. Cinnamon has been shown to possess when ingested and have many pharmacological properties such as antihyperglycemic antioxidants and antibacterial effects. The Methyl Hydroxy Chalcone Polymer (MHCP) found in cinnamon is an effective mimetic of insulin. MHCP may be useful in the treatment of insulin resistance and in the study of the path ways leading to glucose utilization in cells. Cinnamon extracts showed to improve insulin receptor function by activating the enzyme that causes insulin to bind to cells (insulin-receptor-kinase) and inhibiting the enzyme that blocks this process (insulin-receptor-phosphatase), leading to maximal phosphorylation of the insulin receptor, which is associated with increased insulin sensitivity. Moreover, the benefits of cinnamon are reversed upon discontinuing its use. Hence, small amounts of cinnamon along with medication should form a part of the daily diet so that

the blood glucose profile of NIDDM patients can be maintained in a normal range. Key Words: glucose metabolism, insulin resistance, antihyperglycemic, glucose utilization, insulin sensitivity.

THC-P-03

NATURAL BIOACTIVE COMPOUNDS OF LEMON AND THEIR HEALTH BENEFITS

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Citrus genus is the most important fruit free crop in the world and lemon is the third important citrus species. Several studies highlighted lemon as an important health promoting fruit rich in phenolic compound as well as vitamins, mineral, dietary fibre, essential oils and carotenoids. Lemon fruit has a strong commercial value for the fresh product market and food industry. Moreover, lemon productive networks generate high amounts of wastes and by product that constitute an important source of bioactive compounds with potential for animal feed, manufactured foods and healthcare. This review focuses on phytochemistry and analytical aspects of lemon compounds as well as on the importance for food industry and the relevance of citrus lemon for nutrition and health, bringing an overview of what is published on bioactive compounds of this fruit. Keywords: Citrus, lemon, phytochemicals, Analytical techniques and Food Industry.

THC-P-04

POTENTIALS OF ALGAE AS FUNCTIONAL FOOD AND FEED

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Algae have been cultured and used as a human food for many years. In the last four decades, the commercial production of micro algae that are rich in provitamin A carotenoids has been mainly focused on spirulina, chlorella, and dunaliella. These micro algae are the cell organisms that can easily grow in either fresh water or sea water. In addition to high levels of provitamin A, dried micro algae can provide various other nutrients including proteins, minerals, vitamins, and antioxidants. World production of consumable algae and algae products to be used as dietary supplements, food additives, functional foods, and medicines has reached thousands of tons per year. Because of their potential use as biofuel, production will undoubtedly increase. However, many of the nutritional intervention studies for nutritional rehabilitation of malnutrition are of poor-methodological quality and have to be interpreted with caution. In this article, recent progresses on the suitability of algae and

their health benefits for humans and animals will be reviewed. *Keywords:* algae, food, feed, spirulina.

THC-P-05

THE EFFICACY OF TEA POLYPHENOL ON SELECTED WOMEN HYPERLIPIDEMIC SUBJECTS

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Hyperlipidemia, Hyperlipoproteinemia, Dyslipidemia or Hyperlipidaemia is the presence of raised or abnormal levels of lipids and lipoprotein in blood. Lipids and Lipoprotein abnormalities are regarded as highly modifiable risk factor for cardiovascular diseases due to the influence of Cholesterol. Green tea flavanoids are believed to be effective antioxidants that can protect against several chronic diseases especially, cardiovascular diseases. Higher concentration of antioxidant polyphenol, tea flavonoids (catechins), especially Epigallocatekin gallate (EGCG), may be responsible for beneficial effect of green tea. Based on observation that consumption of flavanoid rich food contributes to cardiovascular risk reduction. The objective of this study design was to evaluate green tea as diet component and its relation with blood lipid profiles in primary prevention treatment of patients with dyslipidemia. Impact of green supplementation on lipid profile value of selected women subjects is discussed. When comparing final values of experimental group there is difference between the total cholesterol, LDL, TGL was observed after supplementation. Hence it is significant at 0.01 percent level in control group, no significant difference was noted in total cholesterol LDL, HDL, VLDL, TGL after supplementation. When comparing the initial and final values, HDL was increased in experimental group.

THC-P-06

KRILL OIL - A NOVEL FOOD SUPPLEMENT FOR HUMAN HEALTH

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Krill the marine zooplankton constitute the most populous oceanic animal species. It is a small sized crustacean of the order Euphausiacea that inhabit cold water oceans globally as large surface swarms. The oil extracted from Antarctic *Euphausia superba* and Pacific *Euphausia pacifica* are the richest source of omega-3 polyunsaturated essential fatty acids i.e. Eicosapentaenoic acid (EPA, 20:5n-3) and Docosahexaenoic acid (DHA, 22:6n-3) in their phospholipid form. The other important constituents include Astaxanthin (a potent antioxidant) and high-quality proteins containing essential amino acids.

Krill oil has achieved novel food status (NFS) of European Union and generally recognized as safe (GRAS) by American Food & Drug Administration (FDA) for human consumption. Dietary supplementation of krill oil is well tolerated without adverse effects and reported to be useful against rheumatoid arthritis, obesity, premenstrual syndrome, neuronal as well as cardio-vascular disorders and keep blood lipid profile healthy. Representing its high nutritional value, krill is categorized as innovative marine raw material. Recently, krill harvest has increased from 1.2×10^5 to 2×10^5 ton in last five years owing to its scientific findings and utilization. These shrimp-like tiny organisms have enormous health applications and information in this article is an attempt to create awareness among mankind to achieve multitude of benefits from this natural resource. *Key words:* *Euphausia superba*, EPA, DHA, Astaxanthin.

THC-P-07

REVIEW ON HEALTH BENEFITS OF PHYTOESTROGENS

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Phytoestrogens are substance found in plants that can intimate (to a certain extent) the activity of estrogen in humans. A litany of health benefits including a lowered risk of osteoporosis, heart disease, breast cancer and menopausal symptoms are frequently attributed to phytoestrogens. Phytoestrogens exerts their beneficial effects through several mechanisms that slows cell growth and prevent inflammations. Researchers found that six months of supplementations with soy-isoflavones organic compounds rich in phytoestrogens reduces menopause vasomotor symptoms, such as hot flashes and night sweats by 40% and also reduces symptoms insomnia and depression. In a 2012 issue of "The Journal of Nutrition, Health and Ageing" the research team reported that increased intake of isoflavones significantly reduces the risk of stroke recurrence among subjects of their study groups. Phytoestrogens helps boosting antioxidants levels, preventing the blood from clotting and also lowering blood pressure. Evidences are emerging that dietary phytoestrogens plays a beneficial role in obesity and diabetes. It is shown in studies that soy-protein associated with isoflavones and flaxseeds rich in lignans that are phytoestrogens improves glucose control and insulin resistance. In all it is said that foods like flaxseeds, soy and food rich in lignans, isoflavones that are phytoestrogens help in giving various health benefits to individuals and give them excellent health in future.

TECHNICAL SESSION –IV

FOOD ENGINEERING AND BIOTECHNOLOGY (FEB)

FEB-O-01

GC-MS PREDICTION OF THE SAFETY OF DRIED AND SMOKED FISH SOLD IN SOKOTO

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The safety of smoked and dried fish sold in Sokoto metropolis was evaluated using toxigenic fungi and volatile compound as index. Toxigenic fungi were isolated using palm kernel agar and volatile compounds determined by gas chromatography mass spectrometry analysis (GC-MS). Majority of smoked and dried fish sold in Sokoto belong to the genus *Heterobranchus bidorsalis*, *Oreochromis niloticus*, *Lutjanus spp*, as well as head and tail of stock fish. Six different fungal species were identified; *Aspergillus flavus*, *Aspergillus niger*, *Aspergillus fumigatus*, *Fusarium spp*, *Cryptococcus neoformans* and *Candida krusei*. Nine (9) volatile compounds were detected in *Heterobranchus bidorsalis*, (15) in stock fish tail, (6) in head, (18) in *Oreochromis niloticus* and (16) in *Lutjanus spp*. The compounds 1, 6-methano(10) annulene, n-hexadecanoic acid and butylated hydroxytoluene were common to all samples contaminated with *Aspergillus flavus* and *Fusarium spp*. Higher concentration of n-hexadecanoic acid was recorded in *Aspergillus flavus* contaminated samples in the range of (37.60%-9.84%). This result could provide baseline knowledge that could be utilized as a rapid index tool to predict the presence of these mycotoxigenic fungi in smoked dried fish.

Key words: Toxigenic fungi, volatile compounds, *Aspergillus*, *Fusarium*, GC-MS.

FEB-O-02

EVALUATION OF VIABILITY OF BACTERIA USING IN VITRO GASTRO INTESTINAL MODEL AND FORMULATION OF FUNCTIONAL FOOD WITH SYMBIOTIC MICROCAPSULES

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Probiotic microbes are proved to offer beneficial

effects to human health by several researchers all over the world. Microbes are required to have some essential characters in order to be utilized as probiotics. One of the important characters is to resist the stress conditions of stomach (pH 2.0 and digestive enzyme pepsin) and small intestine (bile and pancreatic enzymes). To check the efficiency of microbial isolates for ability to transit stomach and small intestine in a viable state, in vitro gastro intestinal model is used. In vitro gastro intestinal model assembled in Department of Fermentation and Biosynthesis, Faculty of Food Science and Nutrition, Poznan University of Life sciences, Poznan consists of three compartments namely (i) automatic pH controller, (ii) acid and alkali dispenser, and (iii) water bath with magnetic stirrer. Eleven bacterial isolates were checked in free and encapsulated form and five of them were found to be tolerating the stress conditions of stomach and small intestine. It was also found that encapsulation protects the bacteria from stress conditions and enhances their survival. Synbiotic microcapsules were prepared using mushroom extract as prebiotic sources. Synbiotic microcapsules were incorporated with health mix to form dry functional food. Survivability of bacteria in dry functional food was checked at pre-determined time intervals and the results revealed that bacteria retained viability in dry food during storage period.

FEB-O-03

INFLUENCE OF PROTEOLYTIC MICROORGANISMS ON ACE-INHIBITORY ACTIVITY AND RELEASE OF BIOACTIVE PEPTIDES DURING FERMENTATION OF MILK

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In this study, bacterial isolates i.e. *Lactobacillus rhamnosus* (NS4 and NS6), *Lactobacillus helveticus* MTCC 5463 (V3), *Lactobacillus delbrueckii* (009), *Enterococcus faecalis* (ND3), *Enterococcus faecalis* (ND11) and *Lactobacillus rhamnosus* (SH8) were evaluated for their short chain fatty acids, proteolytic activity, ACE-inhibitory activity and release of peptides during fermentation of skim milk under specified growth conditions. Lactic acid bacteria have strong proteolytic systems. However, NS4 and OO9 showed maximum proteolytic activity and ACE inhibitory activity compared to other isolates. Water soluble extract derived from fermented milk exhibited bioactive peptides. Even, OO9 showed maximum peptides separation compared to other isolates during RP-HPLC analysis. These peptides produced by the isolates may be responsible for showing ACE inhibitory activity.

FEB-O-04

STUDIES ON THE EFFECT OF ETHREL AND DIFFERENT WRAPPING MATERIALS ON POST - HARVEST CHANGES OF PAPAYA FRUITS (*CARICA PAPAYA L*)

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The present experiment entitled, "Studies on the effect of Ethrel and Different Wrapping Materials on post-harvest changes of papaya fruits (*Carica papaya L.*)" was carried out to investigate the effect of ethrel and different wrapping materials on percentage loss of weight, acidity, reducing sugar and total carotenoids of papaya fruits. Ethrel has been found very effective growth regulator in ripening and improving fruit quality in many climacteric as well as non-climacteric fruits. The objective of this work was to evaluate the effects of various concentrations of Ethrel (500ppm, 750ppm, 1000 ppm and 1500ppm) on shelf life of papaya fruits alone and in combination with various wrapping materials like paddy straw, tissue paper, newspaper and shrink film when stored under ambient conditions. The treated fruits were observed for biochemical aspects such as loss of weight (%), acidity (%), reducing sugar (%) and total carotenoids (mg/100g). The observations were recorded at 3, 6 and 9 days after storage and the experiment were laid down using Completely Randomized Design. From the experiment it was clear that the overall performance of the above characteristics was found the best when the fruits were treated with 1500ppm ethrel followed by 1000ppm ethrel in combination with paddy straw. Keywords: Papaya, ethrel, wrapping material, ripening and shelf life.

FEB-O-05

POLYMERASE CHAIN REACTION IN IDENTIFICATION OF *YERSINIA ENTEROCOLITICA* IN MILK AND DAIRY PRODUCTS

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On analysis of 2431 samples of milk and dairy products in Chennai for the incidence of *Yersinia* species, twenty isolates were identified as *Yersinia* sp. by the biochemical method which includes 9 *Yersinia enterocolitica*

(0.37%), 6 *Y. frederiksenii* (0.25%) and 5 *Y. kristensenii* (0.21%). On molecular analysis viz. PCR and multiplex PCR, of the nine *Y. enterocolitica* isolates identified, 4 were found to be pathogenic (44.44 %) by harbouring virulent genes specific for pathogenicity and 5 were non pathogenic (55.56 %) out of the nine *Y. enterocolitica* isolates identified.

Key words: Milk – *Yersinia enterocolitica* – PCR – Multiplex PCR.

FEB-O-06

MICROBIAL STUDIES OF FINGER MILLET LASSI

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'*Chaach*' or '*Mattha*' also called as '*lassi*' refers to desi buttermilk, which is the byproduct obtained while churning curdled whole milk with crude indigenous devices for the production of desi butter. On the basis of different levels of finger millet flour; various lots of *lassi* were prepared and evaluated for microbial quality. *Lassi* samples were subjected to microbial analysis viz. Standard Plate Count (SPC), Yeast and mould count (YMC) and Coliform counts. For this purpose, selective samples; control (T₀) and sensorily best sample (T₂) were considered. The SPC was observed more or less same; T₀ (13.20 X 10² cfu /ml) and T₂ (10.80 X 10² cfu /ml). The samples under study showed presence of Yeast and mould count at very low levels, (8.94 X 10² cfu /ml) for T₂ and (10.26 X 10² cfu /ml) for T₀. Coliform were very less detected which is an indicative that utmost hygienic conditions were followed during production, processing, handling and storage.

FEB-O-07

STUDIES ON MICROBIAL PROPERTIES OF BURFI BLENDED WITH DIFFERENT LEVELS OF ASH GOURD PULP

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Burfi retains its quality for considerable long period at atmospheric temperature due to its low moisture content and higher concentration of sugar. The method of preparation also ensures the destruction of almost all micro organisms present in raw material. Ash gourd *burfi* was prepared from different proportion of ash gourd pulp blend. The product obtained was subjected for microbial evaluation. The average standard plate count of fresh sample was found to be 7, 10, 13 and 17 x 10³ cfu per gm for treatments T₁, T₂, T₃ and T₄, respectively. The yeast

and mould count of *burfi* ranged between 3 to 14 cfu per gm. The highest count was observed in treatment T₄ followed by T₃, T₂, and T₁. In the present study ash gourd *burfi* was found to be free from coliform. It was also observed that the overall acceptability score for treatment T₁, T₂, T₃ and T₄ was 8.68, 8.53, 7.99 and 7.21, respectively. It can be concluded that the ash gourd pulp can be well utilized for preparation of nutritious, palatable and low cost *burfi* by blending 5 per cent ash gourd pulp with 95 per cent *khoa* on weight basis.

FEB-O-08

STUDIES ON MICROBIAL CHANGES OCCURED DURING STORAGE OF PANEER PREPARED FROM BUFFALO MILK BLENDED WITH SOYMILK

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Paneer prepared from 75 percent buffalo milk blended with 25 per cent soymilk was used to study the shelf-life of *Paneer*. Microbial analysis i.e. Standard Plate Count (SPC), yeast and moulds count was done during storage on the day of preparation and subsequently on 2, 4, 6, 8 and 10 days at room temperature (28+2^oC) and refrigerated temperature (5+2^oC) and Standard Plate Count was recorded as 2.10X10³, 2.66X10³, 2.80X10⁴, 4.18X10⁴, 4.41X10⁴ and 5.42X10⁴ and 2.10X10³, 2.36X10³, 1.32X10⁴, 1.90X10⁴ , 2.36X10⁴ and 4.30X10⁴ during 0,2,4,6,8 and 10 days of storage under room temperature and refrigerated temperature, respectively. The counts for yeast and moulds were recorded as 1.40X10¹, 1.61X10¹, 2.87X10², 2.91X10², 3.25X10² and 5.85X10² and 1.40X10¹, 1.71X10¹, 1.78X10², 1.85X10², 2.98X10² and 3.62X10² during 0, 2,4,6,8 and 10 days of storage under room temperature and refrigerated temperature, respectively. The results revealed that after 2 days and 6 days of storage the *Paneer* stored at room temperature and refrigerated temperature was found to spoil due to mouldy growth, putrid flavour and surface discoloration making the product unfit for judging. The shelf life of *Paneer* at room temperature (28+2^oC) was only 24 hours and spoiled after 48 hours of storage.

FEB-O-09

EFFECT OF SYNBIOTIC COMBINATION ON LT AND ST TOXIN GENE EXPRESSION IN ENTEROTOXIGENIC *ESCHERICHIA COLI*

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Enterotoxigenic *Escherichia coli* (ETEC) are the

most potential causative agent found in secretory diarrhea cases. Current prophylactics like use of antibiotics were found to cause resistance among gut microflora while use of vaccines is under developmental stages with narrow spectrum response. On the other side, meta-analysis studies on probiotics describe them as safe and effective way for prevention of diarrhea. Benefits of probiotics can be further facilitated by use of non digestible oligosaccharides or prebiotics. Keeping these in view, present investigation was aimed to analyze effect of effective synbiotic combination co-cultured with enterotoxigenic strain ETEC. Initially, 8 NCDC cultures were screened for prebiotic utilization using prebiotics i.e. FOS, inulin and maltodextrins in basal media. Here results demonstrate FOS as suitable prebiotic for the growth of probiotic culture. During co-culturing, harvested cell mass was used for LT and ST gene expression studies using RT-qPCR. Gene expression predicted maximum down regulation in both LT and ST toxin gene expression levels in presence of FOS while maximum in case of inulin. The results was found parallel to drop in pH, lower pH showed maximum reduction in gene expression without significant decrease in log count.

FEB-O-10

STUDIES ON MONASCUS PIGMENT PRODUCTION AND DETOXIFICATION OF CITRININ

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Studies were carried out on production of pigment using submerged and solid state culture from *Monascus*. Submerged state pigment production was carried out using various media composition like Potato dextrose agar, Malt extract, and chemical media. In this study three different types of media were screened for pigment production; PDA, chemical media and malt extract. Out of these three media, chemical media gave the maximum pigment production (3.6 O.D₅₁₀ units/ml) followed by PDA (3.4 O.D₅₁₀ units/ml) and malt extract media (2.8 O.D₅₁₀ units/ml), so chemical media was further chosen to optimize different carbon and nitrogen sources and environmental factors such as pH and temperature. Glucose showed the maximum pigment production followed by maltose and fructose. Along with the pigment *Monascus purpureus* also produces citrinin. For the analysis of citrinin TLC and HPLC were carried out. The presence of citrinin in wheat and PDA were confirmed by TLC while in others sample citrinin was confirmed by HPLC. Various chemical and biological methods were carried out for citrinin detoxification like adsorption by celite, charcoal, treatment with H₂O₂, out of which adsorption by celite was proved to be more effective for citrinin detoxification as there was reduction in A.U from 0.028 to 0.002 at 330nm as confirmed by HPLC. So we can say that after citrinin detoxification, *Monascus* pigment can be used for food applications.

Keywords: *Monascus purpureus*, PDA, TLC, HPLC, citrinin, detoxification.

FEB-O-11

DEVELOPMENT OF SHELF STABLE INTERMEDIATE MOISTURE TOMATO (*LYCOPERSICON ESCULENTUM*) SLICES USING RADIATION AS HURDLE TECHNOLOGY

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Tomato (*Lycopersicon esculentum*) is highly perishable and difficult to preserve fresh for long periods at ambient temperature and humidity. Shelf-stable intermediate moisture (IM) tomato slices were developed based on 'hurdle technology'[HT] which included the combination of the factors like drying by two methods - Infrared drying (IR) / Tray drying (TD) to reduce water activity [a_w] to 0.6, pre-treatments and packaging. The product was stored in 400 gauge polyethene and treated with low doses of gamma radiation 2.5 kGy as a major hurdle technology and observed for shelf life stability at ambient conditions (30°C and 65% RH). Infra red dried tomato slices treated with gamma radiation (IRR) were found to be stable up to 6 months without substantial loss of flavor, taste, color and texture than the other treatments. IRR yielded IM Tomato slices with improved rehydration potential, appearance and with the nutrient retention up to 51.9 % of β -carotene, 51.3% of total carotenoids 58% lycopene and 32.89% of vitamin C more than the tray dried IM Tomato slices. The product was microbiologically safe throughout the study. Infrared drying using radiation as hurdle technology could be suggested as a potential method for obtaining high quality IM products with optimum sensory, microbial and nutritional quality. **Keywords:** Shelf stable, intermediate moisture, hurdle technology, Infrared drying, gamma radiation.

FEB-O-12

PHYSICOCHEMICAL PROPERTIES OF MARKET MILK SOLD IN AHMEDNAGAR CITY

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Present investigation was carried out to assess the chemical composition and microbial quality of market milk sample. There was a great difference in physicochemical properties of market milk sold in ahmadnagar city of different brands. The fat content in market milk samples of different brands ranged from 3.55 to 3.97 per cent with an average of 3.54 per cent. The protein content ranged from 3.07 to 3.42 per cent with an

average of 3.19 per cent. The lactose content was ranged from 4.32 to 4.65 per cent with an average of 4.5 per cent. The market milk brands shown acidity levels in the range 0.13 to 0.15 % LA with an average of 0.15 % LA. The milk indicated pH in the range 6.62 to 6.69 with an average of 6.65. The ash content was in the range 0.69 to 0.76 per cent with an average of 0.72 per cent. The specific gravity of market milk brands was ranged from 1.025 to 1.030 with an average of 1.027. The average standard plate count of market milk was found to be 28, 22, 31, 34 and 38x 10³cfu per gm for different brands, Coli form count observed in market milk was 4.00, 4.25, 10.25, 19.25, and 13.25 respective whereas Yeast and mould count of market milk sample was found to be 4.25, 4.25, 10, 13, and 7.25 respectively. **Key words:** Chemical composition, Microbial quality.

FEB-O-13

EVALUATION OF *LACTOBACILLUS PLANTARUM* STRAINS FOR HYPOCHOLESTEROLEMIC, ANTIOXIDATIVE AND ANTIMICROBIAL ATTRIBUTES

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Elevated serum cholesterol level is considered high risk factor for the development of cardiovascular diseases. The cholesterol reduction by probiotics has becomes research area of great interest worldwide. Reduction in blood serum cholesterol by 1 % could reduce risk of coronary heart disease by 2-3%. The present investigation was carried to evaluate probiotic *L. plantarum* strains for hypocholesterolemic, anti-oxidative (ABTS & DPPH method) and antimicrobial attributes for preparation of functional dairy foods. *L. plantarum* 94 and *L. plantarum* 95 reduced cholesterol upto 74.15 and 71.99% in MRS broth. The resting and dead cells of these strains exhibited cholesterol reduction upto 28.45, 27.70 and 25.89, 23.07%, respectively and biotransformed cholesterol to coprostanol as detected by TLC method. The antioxidant activity of *L. plantarum* 94 and *L. plantarum* 95 was 88.92, 91.59 %, determined by ABTS method whereas these values for DPPH methods were 41.07, 43.18%, respectively. These isolates exhibited strong antagonistic activity against gastrointestinal pathogens (*E.coli* 0157:H7, *S. aureus* MTCC 3160, *S. typhi* NCDC 113, *P. aeruginosa* MTCC 741, *E. coli* ATCC 25922, *L. monocytogenes* ATCC 15313). The results provided experimental evidence to strengthen the hypothesis that probiotics could remove cholesterol via the incorporation of cholesterol into the cellular membrane and by conversion of cholesterol to coprostanol. These strains may be used as probiotic cultures for development of fermented dairy products to alleviate hypercholesterolemia and oxidative stresses as well as prevention of gastrointestinal infections.

FEB-O-14

ANTI PROLIFERATIVE EFFECT OF ETHYL ACETATE AND METHANOLIC EXTRACTS OF *PERGULARIA DAEMIA* (FORSK) ON ORAL CARCINOMA CELLS (KB) INVOLVES ENHANCED CYTOTOXICITY, GENOTOXICITY AND OXIDATIVE STRESS

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Oral cancer is the most important life threatening disease spread all over the world. Worldwide 4, 50,000 new cases of oral cancer diagnosed and in India approximately 30,000 people lives with oral cancer. The major risk factors associated with oral cancer are environment and life style such as frequent use of alcohol, betel quid chewing and tobacco smoking. The high morbidity and mortality associated with oral cancer are largely due to its poor prognosis and lack of effective molecular markers to predict oral precancer. Therefore the challenges of drug discovery for more effective chemotherapy of oral cancer persist. There are many synthetic drugs available to treat oral cancer but there aren't much recommended by the herbalist due to various side effects. The use of traditional medicine is widespread and plants provide a large source of natural antioxidants that might served as leads for the development of novel drugs. Therefore, investigations of natural antioxidants and bioactive compounds for preservation of traditional medicines and use in treating certain human diseases including cancer have received much attention. One of the plant that was believed to possess potential anticancer activity is *Pergularia daemia* (Forsk) Chiov. (Asclepeadacea). The plant has been used by practitioners of traditional medicine to treat various types of ailments such as analgesic, antipyretic, antioxidant, hepatoprotective, anti-inflammatory and antidiabetic. The main objective of this study is to determine the anti proliferative effect of ethyl acetate and methanol extracts of *Pergularia daemia* on oral carcinoma (KB) cells. The whole plant was extracted with two different solvents (Ethyl acetate & methanol) and the antioxidant/ oxidative stress ability of both extracts were determined by assessing the status of TBARS, super oxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPX) and reduced glutathione (GSH) in KB cells. Anti proliferative potential of *Pergularia daemia* was evaluated by using MTT assay, for this human oral carcinoma cells (KB) were treated with various concentration of extracts (250,500,750 & 1000 µg/ml). The single cell gel electrophoresis (comet assay) was used to analyse DNA damage inducing in KB cells. The tail length, tail movement and olive tail movement were measured. The elevated levels of TBARS with concomitantly decreased antioxidant status were observed in ethyl acetate and methanol extracts treated cells. Additionally the extracts possess the anti proliferative and genotoxicity on oral carcinoma (KB) cells at the concentrations of 500 & 1000 µg/ml. On examination the methanolic extract of *Pergularia daemia* exhibits higher

anti proliferative activity in a dose and concentration dependent manner than ethyl acetate extract. This could be attributed to its high content of poly phenolic compounds either solely or in combination in methanol extract fraction. The result obtained justifies the traditional usage of *Pergularia daemia* from their antioxidant and antiproliferative activity. Further mechanistic studies would help in proving the efficiency of the selected plant under in vivo conditions. Key words: *Pergularia daemia*, KB cells, Anti oxidant, MTT, Comet assay

FEB-O-15

SCREENING OF YEAST CULTURES FOR ETHANOL PRODUCTION FROM WHEY

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Whey is a liquid byproduct of dairy industry, which is obtained by coagulating and separating the casein proteins from whole or skim milk. The composition of whey varies according to its origin and the cheese-making technique employed. It is a very dilute by-product stream with only 6-7% solids and one-fifth of the initial milk proteins present. Most abundant nutrients are lactose, soluble proteins, lipids and mineral salts. Disposing of whey by most of milk plants which do not have proper pre-treatment system is the major issue. As a result of which, there can be significant loss of potential food and energy source as whey retains about 55% of total milk nutrients. Because of its carbohydrate content and other nutrients, the fermentation of whey to value added products has received wide attention to date. In the present investigation, five yeast cultures (*Kluyveromyces marxianus* var. *marxianus* MTCC 1388, *K. marxianus* var. *marxianus* MTCC 1389, *K. marxianus* var. *lactis* NCIM 3465, *K. marxianus* var. *lactis* NCIM 3551 and *K. marxianus* WIG 2) have been employed for the production of ethanol from whey based medium. Among these yeast cultures tested, maximum ethanol production was obtained with *Kluyveromyces marxianus* WIG 2. Further, the medium optimization was also carried by the supplementation of various nitrogen sources and salts to maximize production of ethanol from whey.

FEB-O-16

SYNTHESIS OF ORGANIC NANOPARTICLE FROM BSA (BOVINE SERUM ALBUMIN) AND THEIR EFFECTS ON STORAGE STABILITY OF BANANA CHIPS

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BSA nanoparticles were prepared by desolvation method. Addition of NaCl also affected the particle size as increase in NaCl content enhanced the hydrophobicity leading to larger particle size. The nanoparticles produced

at pH 9 were found stable during the 30 days of storage when compared to the nanoparticles prepared at pH 7. The blanched banana slices were pre-treated with nanoparticle coatings before frying. The banana chips coated with nanoparticles was found effective and was capable of reducing the rate of oxidation of the banana chips and maintained the stability of the oil when compared to the control. The banana chips pre-treated with nanoparticle prepared at pH 9 showed significant less oil uptake (10%) than the control (37.8%) and those banana chips coated with nanoparticle prepared at pH 7 absorbed 21.5% of oil during frying. The colour, texture and flavour of pre-treated banana chips were found acceptable by the sensory panelists. Keywords: nanoparticles, hydrophobicity, banana chips, texture.

FEB-P-01

ISOLATION AND CHARACTERIZATION OF LACTIC ACID BACTERIA FROM THE TRADITIONAL FERMENTED FOODS FROM NORTH GUJARAT REGION

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Fifty three samples of fermented foods like dahi, lassi, Idli Batter, Dhokla Batter, Butter milk, shrikhand, jalebi batter were collected from different towns of North Gujarat region for isolation and characterization of lactic acid bacteria. The average count of lactic acid bacteria in all the products was in the range of 10^6 - 10^8 cfu/g. Both mesophilic and thermophilic types of LAB including Gram positive rods, cocci and tetrads were also found. Total 151 isolates were picked-up and checked by morphology characteristics by grams staining. All were tested for catalase test. Only catalase negative and gram positive isolates were considered further for their ability to coagulate milk. Sugar fermentation patterns were carried out against these selected isolates following API kit method. Finally, molecular characterization through 16S rRNA sequencing of all the biochemically identified organisms were carried out and contig report of the sequences were deposited to the NCBI Gene Bank. In this study, we found *Enterococcus* genus as well as *Lactobacillus* genus out of these selected isolates. However, these organisms are good acid producer in skim milk medium and produce a firm and compact curd. These isolates can be used for the production of fermented dairy foods in future after confirming their safety.

FEB-P-02

ASSESSING ANTIMICROBIAL ACTIVITY OF SPICE OILS AGAINST CERTAIN FOOD-BORNE PATHOGENS

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The antimicrobial activity of various spice oils

were compared in controlling the growth of certain food borne pathogens in this study. The spice oils viz. basil, cinnamon, clove, ginger and tea tree oils used were purchased from Kesar Impacs (Basil aromas), Chennai and were tested against certain food borne pathogens viz. *Bordetella bronchiseptica*, *Escherichia coli*, *Klebsiella pneumoniae*, *Staphylococcus aureus*, *Salmonella typhi*. The reference cultures of these pathogenic bacteria were procured from Microbial Type Culture Collection Centre, IMTECH, Chandigarh. This study was performed by agar well diffusion method and the bacterial suspension of each organisms were swabbed using the sterile swab on the petriplates. Twenty μ l of each spice oils were inoculated into the wells after boring with 6 mm cork borer, along with control. The zones of inhibition were measured after incubation period of 24 hrs at 37^oc. The essential oils of tea tree was the most effective (25mm) in controlling the growth of pathogenic organisms followed by clove and cinnamon oils (15 and 10mm respectively), whereas basil oil exhibited minimum efficacy (1mm) and ginger oil was considered ineffective as there was no inhibition. Key words: Food borne pathogens – Spice oils - Antimicrobial activity.

FEB-P-03

STUDY ON MICROBIAL ANALYSIS OF STREET-VENDED FOOD SAMPLES SOLD IN SALEM DISTRICT

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The present study was carried out to assess the microbiological quality of street-vended multi food samples which was obtained from two different locations of Salem District, Tamil Nadu. Totally six food samples (2 Chinese food, 2 South Indian food and 1 Punjabi foods) were collected from the vendor in an aseptic container and immediately transferred to the laboratory for analysis. The same street vendor foods were made at home for standardization. By comparing the results of streets vended foods and homemade foods, street vended foods showed more viable microbial counts (spores, yeast, gram-ve rods and gram+ve cocci) than the foods standardized at home. Measures need to be taken to ensure that street vendor food ingredients should be produced and stored hygienically at appropriate temperatures and well protected from flies, dust, wind, and all sources of contamination. Keywords: Microbial, Laboratory, Homemade, Standardization.

FEB-P-04**PREPARATION OF ALPHA-GLUCOSIDASE AND DPP-IV INHIBITORY MILK BIOACTIVE PEPTIDES BY USING LACTOBACILLUS SPP FOR MANAGEMENT OF TYPE-2 DIABETES****Prasad Patil, Santosh Anand, Surajit Mandal and Sudhir Kumar Tomar**

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Diabetes is a metabolic disorder and is characterized by high blood glucose level (Hyperglycemia). Antidiabetic property of bioactive peptide is related to inhibition of Alpha- glucosidase and Dipeptidyl Peptidase-IV (DPP-IV) enzymes, which cause Type 2 diabetes. Therefore, inhibition of α -glucosidase and DPP-IV is an effective strategy for controlling/managing of Type 2 diabetes. Hence, the present study has been designed to exploit the proteolytic activity of *Lactobacillus* spp. for the production of α -glucosidase and DPP-IV inhibitory milk peptides. Among 21 strains of Lactobacilli, the proteolytic activity measured using OPA method ranged between 1.77 to 3.13 mg of leucine/ml whereas unfermented milk sample had very low peptide content (0.046 mg/ml). The α -glucosidase inhibitory activity was highest for the hydrolysate from *L. helveticus* NCDC 288 and *L. helveticus* NCDC 292 i.e. $46.62 \pm 0.88\%$ and $43.83 \pm 0.53\%$ respectively, followed by *L. rhamnosus* NCDC 24 ($40.12 \pm 1.38\%$). The highest DPP-IV inhibitory activity was observed for the *L. helveticus* NCDC 288 ($36.95 \pm 0.98\%$) and *L. rhamnosus* NCDC 24 ($34.71 \pm 0.45\%$) and followed by *L. helveticus* NCDC 292 ($34.51 \pm 0.72\%$). The peptide fractions of 10KDa and 3KDa were prepared by ultrafiltration process and fractions were tested for α -glucosidase and DPP-IV inhibitory activity. The results from this study showed that peptides with α -glucosidase and DPP-IV inhibitory activity can be generated by using *Lactobacillus* spp. from milk proteins. Therefore, these peptides can be produced in fermented dairy product by selected proteolytic strains of Lactic Acid Bacteria or peptides rich formulation can be incorporated into functional foods or administered via nutraceuticals.

FEB-P-05**ANTIBIOTIC RESISTANCE PROFILE OF PEDIOCOCCUSSPP FROM DAIRY AND NON-DAIRY SOURCES****Varsha Garg, SurajitMandal, SantoshAnand, Prasad Patil,Poonam Sharma**

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Pediococcus, one of the important lactic acid bacteria, is used as starter and adjunct culture in various food fermentations such as vegetables, meats, sausages, dairy products etc. Increasing consumption of fermented foods around the globe necessitates the screening of

associated organisms for safety parameters. Antibiotic resistance among these organisms is one of the major health concerns worldwide due to chance of horizontal transfer of resistance gene to pathogenic bacteria. Therefore, present study was carried out to isolate and characterize the *Pediococcus* spp. For their antibiotic resistance profile, A total of 14 *Pediococcus* spp. were isolated from various sources including fermented foods, feeds, and human faeces. The isolates were identified by phenotypic and genotypic techniques up to species level. Thirteen of the isolates were found to be *P. pentosaceus* while one was *P. acidilactici* which was isolated from human faeces. Their antibiotic resistance pattern was studied against 20 standard antibiotics by disc diffusion assay and isolates were categorized as resistant, intermediate and susceptible according to the CLSI (2012) guidelines. All the tested isolates were found to be resistant against nalidixic acid and vancomycin while they were sensitive to chloramphenicol and erythromycin. Determination of MIC for antibiotics against which isolates are exhibiting resistance along with their gene location is underway.

FEB-P-06**ASSESSMENT OF COMMERCIAL PROBIOTIC ORGANISMS FOR THEIR ANTIBIOTIC RESISTANCE****Poonam Sharma¹, Vikas Sangwan¹, Sudhir Kumar Tomar¹ and Pawas Goswami²**¹Dairy Microbiology Division, National Dairy Research Institute Karnal, India, ²Department of Microbiology, Bhaskaracharya College of Applied Sciences, New Delhi, India.

Recent studies revealed that modern environmental and human commensal microbial genomes have a large concentration of antibiotic resistance genes. The increased use of fermented food products and probiotics containing massive amounts of bacteria acting as either donors and/or recipients of antibiotic resistance genes in the human GI tract, also contributes to the emergence of antibiotic resistant strains. The proposed problem is that probiotic strains and starter cultures might contain naturally occurring antibiotic resistance genes. Under right circumstances, the antibiotic resistance genes from probiotics could be transferred to a pathogenic bacterium which could then lead to treatment failure of an infection. Keeping these facts in mind, we designed this project to assess the presence of antibiotic resistant genes in probiotic organisms which are prevalent in the market. Commercial products including both pharmaceutical and food preparations, were procured from the Indian market and probiotic organisms were isolated and characterized from them. All the 30 *Lactobacillus* isolates were then used for the assessment of their antibiotic resistant profile using disc diffusion assay against a total of 48 antibiotics. Most of the isolates were found to have resistance against multiple antibiotics as compared with CLSI, 2012. Further, it was found that many of the organisms are having MIC higher than that prescribed, which qualify them as antibiotic resistant organisms. All of the isolates were found to carry plasmids. Their presence on plasmid

makes them highly susceptible to transfer to other organisms present in the gut which may be pathogenic. Screening of different genes responsible for resistance on both plasmid and genomic DNA is underway.

FEB-P-07

EFFECT OF DIFFERENT LEVELS OF SWEET POTATO PASTE ON MICROBIOLOGICAL QUALITY OF *KHEER*

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Kheer is very delicious cereal based indigenous milk product. It has good taste, high nutritional values and relatively low cost. In the present study sweet potato *kheer* was prepared from buffalo milk blended with sugar, sweet potato paste as well as rice and cardamom. Sweet potato *kheer* was prepared from different levels of sweet potato paste viz. 2.5, 5.0 and 7.5 per cent on the basis of buffalo milk. Control *kheer* was prepared using 2.5 per cent rice in buffalo milk. The microbiological quality of *kheer* was accounts on the basis of standard plate count, yeast, mould count and coliform count. The standard plate count was highest in T₃ and lowest in T₀ and has significant difference in between treatments. The yeast and mould count was maximum in T₃ and minimum in T₁. As the sweet potato paste increased in *kheer* the spc and yeast and mould count were increased. Coliform in any dairy product indicate the hygienic condition maintained during production and packaging and coliform count to be absent in sweet potato *kheer*.

FEB-P-08

EFFECT OF MICROBIAL QUALITY OF FRUIT *BURFI* SOLD IN PARBHANI MARKET OF MAHARASTRA STATE

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Burfi is indisputable product having economic importance. *Burfi* is becoming more and more popular in urban areas. *Burfi* is one of the most popular semi-solid, sweetened *khoa* based sweet prepared from cow or buffalo milk. *Burfi* is expected to have good shelf-life. Several varieties of *burfi* are sold in the market of Maharashtra. In Parbhani city strawberry, mango and fig *burfi* are most popular. For the present study standard plate count, yeast and mould count and coliform count were considered. Here treatment T₁- Plain *burfi*, T₂ - Mango *burfi*, T₃ - Fig *burfi* and T₄ Strawberry *burfi*. The result shows that in both standard plate count and yeast and mould count higher in sample T₄ which is microbiologically inferior while sample T₁ showed least count which is better than

other samples. Absences of coliform in any dairy product indicate the hygienic condition maintained during production and packaging. In this way the present study, coliforms are found to be absent in market samples of *burfi*.

FEB-P-09

ANTI-DIABETIC POTENTIAL OF GAMMA-AMINO BUTYRIC ACID (GABA) PRODUCING PROBIOTIC STRAINS OF *LACTOBACILLUS* SPP

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Gamma-aminobutyric acid, a major inhibitory neurotransmitter in animals, is a non-protein amino acid that is widely distributed in nature from microorganisms to plants and animals. GABA also acts as a strong secretagogue of insulin from the pancreas and effectively prevents diabetic conditions. In recent years, lactic acid bacteria (LAB) have been considered as bacterial cell factories for GABA production due to their generally regarded as safe (GRAS) status and special physiological and probiotic properties. Hence, the present study is focused on screening of lactobacilli for GABA production and their probiotic and antidiabetic potential. A total number of 350 strains of *Lactobacillus* spp. were screened for GABA production by thin layer chromatography using silica gel aluminium sheets. Out of them, 17 isolates showed spots on silica gel sheets corresponding to the standard GABA. All these isolates were also found to be positive for *gad* gene which is responsible for converting the substrate monosodium glutamate to GABA in lactobacilli, as a PCR product of 540 bp was obtained. The quantitative production of GABA was also determined spectrophotometrically which revealed GABA production in the range of 109.32±0.13 mM to 239.7±0.03 mM. The GABA producing isolates were further evaluated for various probiotic attributes viz., acid and bile resistance, simulated stomach duodenum passage, autoaggregation, cell surface hydrophobicity, antimicrobial activity, antibiotic sensitivity and bile salt hydrolase activity. This is a new area of research where GABA producing probiotic strains of lactobacilli can be useful for ameliorating the diabetic complications particularly diabetes mellitus type 1 (DM1). Such cultures can be further used for the development of functional foods incorporating health benefits of GABA.

FEB-P-10

**CHARACTERIZATION OF LACTOBACILLI
HAVING PANCREATIC LIPASE
INHIBITORY ACTIVITY**

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Imbalance between the energy intake and expenditure leads to life style diseases like obesity. The key strategy to combat the obesity is to inhibit pancreatic lipases that play an important role in liberation of free fatty acid from ingested lipids. Anti-obesity drugs via these mechanisms are not in an approved and validated status. In the present study, lactobacilli spp. to inhibit pancreatic lipase, were isolated from the different sources. Samples were enriched in MRS broth for 24 h at 37 °C. Isolation was carried out using pour plating of enriched sample in LAMVAB and BCP-MRS agar. Gram positive and catalase negative rods were selected for genomic DNA extraction and cultures were confirmed as lactobacilli through species specific PCR. Preliminary identification was done for non-lipase producers, selected non-lipase producers were subjected to the pancreatic lipase inhibitory activity. Out of 52 isolates, 20 cultures were found to be negative for lipase production and 11 cultures were showing pancreatic lipase inhibitory activity, among them 5 cultures were showing good probiotic attributes *in vitro*. For this, the studies are in progress and will lead to the *in vivo* trials to substantiate the results obtained under *in vitro*.