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TECHNICAL SESSION I

PUBLIC HEALTH NUTRITION (PHN)

PHN-O-01

INDIA AND FOOD SECURITY: A MOVE TOWARDS MALNUTRITION FREE INDIA

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Geopolitical diversity coupled with multicultural amalgamation makes India a unique nation. As a staunch believer peaceful coexistence India highlights a policy of global harmony. Still, as a young country its independence from colonial rule inherited many problems which make India a country of malnourished people. According to the World Bank report India has 33 percent of the world's poorest 1.2 billion people. Though, from its very inception India has been trying to feed citizens a better quality food. Keeping physical and mental health Indian Governments also tried to remove malnutrition among people. It is noteworthy that India tried to achieve one more step toward the betterment of the people and the concept of welfare state. Keeping the highest spirit Indian cabinet approved food security bill on 5th July 2013. Also, the Indian President honourable Mr. Pranab Mukherjee approved food security bill that will help with subsidized food to the two-third of the Indian population. Further, huge food grain stock and rising exports of India's agricultural products gives impression that food security is not a distant goal. No doubt, Indian agriculture is moving towards a success story. In a nutshell India is first in the world in terms of production of milk, pulses, jute and jute like fibre, second in rice, wheat, sugarcane, groundnut, vegetables, fruits and cotton production, and is a key producer of spices and plantation crops as well as livestock, fisheries and poultry sector. Indian finance minister Mr. P. Chidambaram presenting Union budget 2013-14 observed "the original green revolution states face the problem of stagnating yields and over exploitation of water resources. The answer lies in crop diversification. I propose to allocate Rs. 5000 million to start a program of crop diversification that would promote technological innovation and encourage farmers to choose crop alternatives. Food security can be ensured if certain measures are judiciously taken. Better implementation of Public Distribution System (PDS) provides security as well as more job opportunities. Food wastage due to mismanagement is to be brought to the minimum for safer future. There is dearth of food grain complexes and this problem is to be solved at every cost. Theme of food security can't move alone if not paired with total rise in living index. Currently the term food security covers mainly wheat and rice. It definitely is inadequate. The answer lies in food diversification. Furthermore food security through National Food Security Bill bound to ensure food security of nearly 67

per cent of the population by providing 5 kg of rice, wheat or coarse cereals per person per month must not be a political game to secure over other political parties. It is to be considered that implementation of food security bill paves the better environment and work power to strengthen national security and national interests globally. To achieve these goals assistance from developed countries in the fields of agriculture and technology might be a positive step. Equally, role of international organizations such as Food Agriculture Organisation (FAO), United Nations Environmental Program, World Health Organisation are to be considered for sustainable development to correlate and promote social and economic benefits that flow from top to bottom. Lastly, food security is to be minutely analyzed keeping climatic changes due to rise in global temperature, shrinking water resources, and increase in floods and droughts in India.

PHN-O-02

ADDRESSING THE PROBLEM OF MICRONUTRIENT MALNUTRITION IN NEH REGION – UNDERUTILIZED VEGETABLES AS A SOURCE OF FOOD

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The country's population is increasing at the rate of 1.548 percent and it is projected that it will be around 1256 million up to 2015 and 1331 million in 2020. According to the Recommended Dietary Allowances (RDA) of the Indian Council of Medical Research (ICMR), per caput consumption of vegetable must be 280 g, whereas availability of vegetable per caput per day is hardly 241 g. In our country where problem of malnutrition is prevailing in general and micronutrient malnutrition in particular, addressing the household nutritional security is *sine qua non*. Recent studies indicate that intake of micronutrients in daily diet is far from satisfactory and largely less than 50% RDA is consumed by over 70% of Indian population. The loss due to micronutrient deficiency costs India 1 percent of its GDP. This amounts to a loss of Rs. 27,720 crore per annum in terms of productivity, illness, increased health care costs and death. Every day, more than 6,000 children below the age of five die in India. More than half of these deaths are caused by malnutrition—mainly the lack of Vitamin A, iron, iodine, zinc and folic acid. About 57% of preschoolers and their mothers have subclinical Vitamin A deficiency. Anemia prevalence among children under five years is 69% and among women it is over 55% in a recently concluded national study. The consequences of micronutrient malnutrition are unacceptably high morbidity and mortality. Vitamin A, iron and zinc deficiency when combined constitute the second largest risk factor in the global burden

of diseases; 330,000 child deaths are precipitated every year in India due to vitamin A deficiency; 22,000 people, mainly pregnant women, die every year in India from severe anemia; 6.6 million children are born mentally impaired every year in India due to iodine deficiency; intellectual capacity is reduced by 15 per cent across India due to iodine deficiency; and 200,000 babies are born every year with neural tube defects in India due to folic acid deficiency. North East States comprising of 8 states namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, Tripura has a total population of 75,587,982 (source –Census of India, 2011). In North East India 40.1% population is suffering from anaemia whereas in Arunachal Pradesh approximately 29.3% (stunting, wasting, under –nutrition) under age 3 in are suffering from Protein Energy Malnutrition. Underutilized vegetables like drumstick (*Moringaoleifera*), *Momordica Cochinchinensis*, *Momordicadioica*, *Mucuna* spp. etc. embedded with vitamins, minerals, fiber and phyto-chemicals are one of the most suitable options to address the problem of nutritional security. The intake of 350-400 g vegetables per caput per day is associated with reduced incidence of many common forms of cancer, and diets rich in plant foods are also associated with a reduced risk of heart disease and many chronic diseases of ageing. Vegetables contain phytochemicals that have anti-cancer and anti-inflammatory properties which confer many health benefits. Many phytochemicals are colourful, and recommending a wide array of colourful fruits and vegetables is an easy way to communicate increased diversity of intake to the consumer. For example, tomato contains lycopene which is localized in the prostate gland and may be involved in maintaining prostate health, and which has also been linked with a decreased risk of cardiovascular disease. Broccoli, Brussels sprouts and kale, contain glucosinolates which have also been associated with a decreased risk of cancer. Garlic and other alliums contain allylsulphides which may inhibit cancer cell growth. Several studies have suggested a strong link between dietary phytochemical intake and a reduced risk for cardiovascular disease. Dietary flavonoids have been inversely correlated with mortality from coronary artery disease, plasma total cholesterol and low-density lipoprotein (LDL). Further leafy vegetables embedded with numerous micronutrients, principally b-carotene, vitamins B6, B9, E and K, plus iron, calcium and magnesium are one of the cheapest sources to recover quickly from nutritional anaemia.

PHN-O-03

CO-RELATION BETWEEN PHYSICAL ACTIVITY AND BODY COMPOSITION IN YOUNG CHILDREN

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In today's world, the number of children that are out of shape and sedentary are increasing rapidly. There is a decrease in the endurance and strength capabilities of the young children due to more time spent using technology, busy working parents, safety concerns and lack of places to play. To study the physical activity pattern of children aged 7 to 9 years. 702 children aged 7 to 9 years were selected by purposive sampling from nine different schools of Nashik city. They were studying in standard 2nd, 3rd and 4th. Their height, weight and waist circumference was measured using standard procedures. BMI and Waist to Height Ratio was calculated. A questionnaire was given to them to elicit information regarding the physical activity they performed throughout the day. The data was analyzed using SPSS version 16. 13.1 % of the children were at high risk of becoming obese in future, if they continued to lead a sedentary life. 34 % of the entire sample did not have physical training class in their time table. 72.5 % of the children were not involved in any kind of indoor games. 37.7 % children did not play any outdoor games. Children lead a sedentary lifestyle with lack of physical activity appropriate for age. The sedentary lifestyles of children have been attributed mainly to television viewing, computer games, over emphasis on academic excellence, unscientific urban planning and ever increasing automated transport. This problem needs intervention at School, Parents and Community level.

Key Words: Physical activity, sedentary activity, Indoor games, Outdoor games, structured games.

PHN-O-04

PERCEIVED BARRIERS IN ADOPTING A HEALTHY LIFESTYLE AMONG COLLEGE STUDENTS

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Obesity is a global public health problem which spans all age groups across the lifecycle. After alarming rates of obesity seen among children and adolescents, college going students may also be a vulnerable group prone to obesity. The unhealthy lifestyle might be an important factor that contributes to overweight and obesity. However, apart from inappropriate nutrition and physical inactivity there may be presence of certain perceived barriers in adopting

healthy lifestyle in this age group. Hence, this pilot study was conducted to identify the perceived barriers in following a healthy lifestyle. Twenty two subjects, aged 18-24 years, constituted the study sample. Rating scales were used for the data collection. The constructs of the rating scales consisted perceived stress, personal, social and environmental factors that may act as barriers. Each construct had different subscales for which scores were assigned. Results after scoring revealed stress, lack of friends support, type of residences, land use mix-diversity, and lack of crime safety in neighbourhoods' the barriers in adopting healthy lifestyle. The findings will help in developing realistic life-style intervention programs focussing on the coping strategies to overcome these barriers within this age group and therefore if implemented, can bring positive changes towards healthier lifestyle.

PHN-O-05

MATERNAL VITAMIN B₁₂ STATUS AND OMEGA-3 FATTY ACIDS REGULATE LIPID METABOLISM IN WISTAR RAT OFFSPRING

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We have recently demonstrated that maternal vitamin B₁₂ status is critical for determining the pregnancy outcome and also influences metabolic variables and fatty acid status in Wistar rats. The present study was carried out to examine whether these effects sustained in the offspring. Pregnant dams were divided into 5 groups. Control; Vitamin B₁₂ deficiency (BD); Vitamin B₁₂ supplementation (BS); BD group supplemented with omega-3 fatty acid (BDO); BS group supplemented with omega-3 fatty acid (BSO). Offspring were continued on the same diets till 3 month. Vitamin B₁₂ deficiency increased homocysteine (p<0.05), cholesterol (p<0.01) and systolic blood pressure (p<0.05) while it reduced docosahexanoic acid (DHA) levels in plasma (p<0.05) and liver (p<0.01), mRNA (p<0.01) and protein levels (p<0.05) of acetyl CoA carboxylase-1 (ACC-1) in liver. Vitamin B₁₂ supplementation increased triglyceride levels (p<0.01) although it reduced mRNA and protein levels of ACC-1 (p<0.01 for both) and mRNA levels of adiponectin and carnitine palmitoyltransferase-1 (p<0.01 for both). Omega-3 fatty acid supplementation to a vitamin B₁₂ deficient diet normalised cholesterol (p<0.01) and systolic blood pressure (p<0.05). Omega-3 fatty acid supplementation together with vitamin B₁₂ improved DHA levels (p<0.01) and mRNA levels of all the genes (p<0.01) as compared to BS group. Our data for the first time indicates that a combined supplementation of vitamin B₁₂ and omega-3 fatty acids is beneficial as they regulate the expression of genes involved in lipid metabolism.

PHN-O-06

OMEGA-3 FATTY ACID SUPPLEMENTATION TO A VITAMIN B₁₂ DEFICIENT/SUPPLEMENTED DIET INDUCES BENEFICIAL EFFECTS ON BRAIN DEVELOPMENT IN THE SECOND GENERATION OFFSPRING

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The concept of "Developmental Origins of Behaviour, Health, and Disease" highlights the need to examine the effect of maternal nutrition on brain development. We have earlier demonstrated that maternal vitamin B₁₂ and omega-3 fatty acids are interlinked through one carbon cycle and influences brain development in the first (F1) generation offspring. The current study aims to investigate whether these effects sustain in the next generation by examining brain fatty acids, brain derived neurotrophic factor (BDNF) levels and cognition. Pregnant Wistar dams were divided into five dietary groups: Control, vitamin B₁₂ deficient (BD), vitamin B₁₂ deficient + omega-3 fatty acid (BDO), vitamin B₁₂ supplemented (BS), vitamin B₁₂ supplemented + omega-3 fatty acid (BSO). The offspring of F2 generation were continued on the same diet till 3 month of age. Our results demonstrate that vitamin B₁₂ deficiency lowers brain BDNF levels (p<0.05) and results in poor cognitive performance (p<0.05) which was normalised by omega-3 fatty acid supplementation. Vitamin B₁₂ supplemented group showed similar results to that of control. In contrast, omega-3 fatty acid supplementation to vitamin B₁₂ supplemented diet increased the levels of BDNF, DHA and improved cognitive performance (p<0.01 for all). Our data suggests that omega-3 fatty acids can modulate the effects of vitamin B₁₂ and provide vital clues which may be useful in preventing the transmission of cognitive disorders across generations.

PHN-O-07

ASSOCIATION BETWEEN BLOOD SUGAR LEVEL (DIABETIC AND PRE-DIABETIC) AND BODY MASS INDEX IN AN URBAN POPULATION OF VARANASI

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Diabetes mellitus (DM) is one of the most common non-communicable diseases (NCDs) globally. Obesity is one among the conventional risk factors recognized for the development of diabetes in global scenario. Hence the study was conducted to assess the prevalence of diabetes and pre-

diabetes and to see the association between body mass index and diabetes and pre-diabetes in an urban area. This is community based cross sectional study. 700 male and female aged 20-65 years of an urban area of Varanasi were interviewed by using pretested semi structured interview schedule. Fasting Capillary blood glucose level measured with the help of Glucometer. Weight and height measurement was done by using standardised techniques. The data was coded and analysed in MS- excel and SPSS 16th version. Findings reveal that the fasting blood sugar of 11.9 % subjects was in pre-diabetic group and 6.6 % were in diabetic. While 16.4% respondents were under weight 64% were normal weight 18.3% respondents were overweight and 1.3% respondents were obese. Among the underweight respondents 0.9 % was diabetic, 5.8% diabetic were in normal weight category whereas, and prevalence of diabetes was highest (13.1%) among the subjects who were obese. Association between (Body Mass Index) BMI and pre-diabetes and diabetes were found to be statistically significant. P value is < 0.001. Result show that obesity continues to be a major risk factor for developing diabetes. Keyword: Body Mass Index, Capillary Blood Glucose, Diabetes Mellitus, Pre-Diabetes.

PHN-O-08

SEASONAL VARIATION IN IRON STATUS OF ADOLESCENT GIRLS (13-15YRS)

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The iron status of adolescent girls tends to vary with the seasons. The intake of iron and other blood forming nutrients is influenced by availability of foods like green leafy vegetables or oranges or guavas, which influenced iron security and anaemia status. This study investigated the seasonal variation in nutritional status and prevalence of under nutrition among adolescent girls. The present study was carried out in month of May to July 2011 for summer season and December 2011 to February 2012 for winter season. A statistically adequate sample of 120 adolescent girls aged 13-15 years were selected randomly from Government Senior Secondary Schools of Ludhiana district of Punjab. Information regarding frequency of consumption of foods was collected by administering food frequency questionnaire in summer and winter seasons. Frequency of food consumption was quantified by a score system. The iron status of the subjects was assessed by anthropometry and dietary intake in summer and seasons. A considerable seasonal variation was observed in hematological profile of adolescent girls showing higher values of all the parameters during winter season. The prevalence of anaemia (90.84 vs 78.33%) was found higher during summer season. The results of the study concluded that there is statistically significant seasonal variation in the iron status of adolescent

girls. The present study recommends the implementation of season related specific nutrition intervention to improve the overall health of adolescent girls. Key words: Adolescent girls, anaemia, food frequency, iron status and seasonal variation.

PHN-O-09

EFFECT OF BREAKFAST EATING PATTERN ON PHYSICAL ACTIVITY AND ACADEMIC PERFORMANCE INSCHOOL GOING CHILDREN IN DISTRICTLAKHIMPURKHERI

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Breakfast might not just be the most important meal of a child's day -- it might be one of most important meals of their life. School going children do lots of physical and mental activities and hence have more nutritional requirements. To fulfill the nutritional requirement of the body adequate diet is necessary. Morning breakfast is especially important in diet of this age group. The objectives of the study:(a)Assessment of breakfast eating pattern in school going children (8-10 year); (b) To identify major nutrients in breakfast (c) Effect of breakfast eating patternon physical activity and academic performance of school going children. A cross sectional study was conducted in a selected school of Lakhimpur Kheri in which 100 school children aged 8-10 year were interviewed. 24 hour dietary recall method was used to assess breakfast eating pattern and Harvard step test was used for physical activity, class attendance register was used to obtain school attendance. Analysis of data revealed that Children who ate breakfast had 73% capacity of physical activity, 50% examination result, 81% attendances in class. Children who didn't ate breakfast their capacity of physical activity was 21.5%, 18.5% examination result, 37% attendance in the class. Soregular habit of eating breakfast had beneficial influence on concentration, physical activity and academic performance. Key words: Breakfast eating pattern, physical activity, academic performance, 24 hour recall method.

PHN-O-10

CORRELATES OF MACRONUTRIENTS INTAKE OF URBAN ADOLESCENT GIRLS OF VARANASI

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Under nutrition has been a significant problem in adolescent girls primarily due to food gap. Any effort to tackle this problem calls for pinpointing correlates of macronutrient intake by them. In order to explore this

community based cross sectional study was undertaken on 400 adolescent girls (10-19 years) of urban Varanasi, selected by adopting appropriate sampling technique. Their Socio-demographic and other relevant information were obtained by interviewing parents or other responsible family member. Dietary intake of subjects was assessed by 24 hours recall oral questionnaire method and macronutrient intake was computed by using nutritive value for Indian foods. Average intake of energy, protein and fat was 1212 ± 381.10 kcal, 34.201 ± 9.78 gm and 22.16 ± 13.96 gm/day, respectively. These values were 56.03%, 67.19% and 67.12 % of respective estimated RDA. Of the several associates (viz age, type of family, subject's literacy status and number of siblings) only type of family and number of siblings correlated with energy intake on logistic model having correct predictability of 72.5%. AORs for joint family and number of siblings >7 were 0.54 (CI: 0.32-0.92) and 4.38 (CI: 1.19-16.12). Menstrual status and protein intake were significantly associated with each other. Age, caste, family size, SES, family and per capita income, nutrition information were significant associates of fat consumption; effect of all parameters (except age and family size) got eliminated in logistic model. Macronutrients deficiency prevailed in the urban adolescent girls and had a socio demographic gradient.

PHN-O-11

IMPACT OF NUTRITIONAL KNOWLEDGE AMONG MALE EMPLOYEES OF ORGANIZED AND UNORGANIZED SECTORS OF CHANDIGARH

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Urbanization involves alteration in occupational pattern leading to lifestyle changes. These changes cause 'Nutrition Transition' which is reflected in dietary practices with rising consumption of convenience foods which are energy-dense and nutrient-poor. A self designed pre tested questionnaire was used to compare the demographic profile, nutritional knowledge scores and physical activity levels (GPAQ) of 450 male employees of organized (225) and unorganized (225) sectors in Chandigarh. All respondents were literate. The nutritional knowledge scores were higher in the organized sector (21.1 ± 3.4) along with overweight and obesity as compared to unorganized sector (20.4 ± 3.0). A direct relation was seen between educational qualifications and nutritional knowledge in organized sector. 67.56% and 66.2% were moderately active in organized and unorganized sector respectively. With reference to sedentary activity,

respondents in organized sector had higher nutritional knowledge score (21.3 ± 3.6) as compared to unorganized sector (19.8 ± 2.7). The respondents were seen to be aware of ill effects of incorrect dietary practices, but minor efforts were made to follow a healthier lifestyle. Hence, urbanization, changes in dietary habits and physical activity levels have been found to be associated with increased prevalence of overweight and obesity. Key words: Nutritional knowledge, Education, Obesity, Sedentary activity, Nutrition Transition

PHN-O-12

CARDIOMETABOLIC RISK PROFILE AND VITAMIN D STATUS OF WOMEN AGED 30 – 70 YEARS

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Globally, Non Communicable Diseases (NCDs) are recognized as a major cause of morbidity and mortality. In case of middle aged women, the nutritional transition along with menopausal transition poses an additional risk of developing adverse health conditions. The present study was undertaken with the broad objective of assessing the cardiometabolic risk profile and vitamin D status of women aged 30 – 70 years, residing in free population. 792 subjects were enrolled on which information was elicited using standard techniques. The anthropometric analysis showed a high prevalence of overweight (15.53%) and obesity (61.49%). The medical profile of the subject showed 21.97% prevalence of hypertension, 8.21% prevalence of diabetes mellitus, and 3.03% prevalence of dyslipidemia. In phase II, when the subjects were categorised as per their menopausal status, it was observed that postmenopausal subjects had significant risk factor for developing hypertension. From 113, 60 subjects were randomly selected under pre and post menopausal categories and were assessed for cardiometabolic risk factors and presence for risk factors of vitamin D using the biochemical parameters. 45% of the subjects had higher than the normal levels of cholesterol. Almost 90% of the subjects had Vitamin D levels below 20ng/ml. A significant positive correlation was found between TSH and serum 25(OH) D levels ($p < 0.05$).

PHN-O-13

EFFECT OF BIO- SOCIAL VARIABLES ON BIRTH WEIGHT OF INFANTS

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Weight of baby at birth reflects the mother's health and the newborn's chances for survival, health and psychosocial development. WHO has reported that, the prevalence of low birth weight infants is 15.5 percent or approximately 20 million of all births. The study was aimed to analyse various bio-social factors that leads to low birth weight in infants. Sixty mothers of low birth weight babies, within a period of one week after delivery, from Ernakulam and Alappuzha districts were chosen as sample using purposive sampling method. Interview schedule was administered to elicit information on personal profile, self care measures adopted, complications encountered prior /during pregnancy, stress faced during gestational period and dietary pattern. The dietary pattern was assessed by availing details regarding the frequency of consumption of each food item. The study revealed that stress had a significant negative correlation with the birth weight. Complications came across during pregnancy disclosed negative effect on birth weight. Inadequate diet seems to contribute towards low birth weight. The self care measures adopted by mothers seem to be passable and consequently no effect on birth weight was established. The study concluded that stress, complications and inadequate diet seems to have negative influence on birth weight of infant.

PHN-O-14

NUTRITIONAL STATUS IN CIRRHOTIC PATIENTS WITH MINIMAL HEPATIC ENCEPHALOPATHY (MHE) AND NON MINIMAL HEPATIC ENCEPHALOPATHY (NON MHE)

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Minimal Hepatic Encephalopathy (MHE), a preclinical stage of spectrum, is hepatic encephalopathy (HE) in its mildest form and presents in about 30-84% patients with liver cirrhosis. MHE is an important disorder that impairs patients daily functioning and HRQOL in patients with cirrhosis. Malnutrition is extensively prevalent among this community of patients and has adverse effect on their quality of life and prognosis of the disease. The objective of the study was assessment of the nutritional status in cirrhotic patients with MHE and Non MHE. 119 cirrhotic patients

without overt HE were evaluated by psychometry tests and Critical Flicker Frequency. Nutritional assessment was based on anthropometry, 24 hours dietary recall, SGA and MUST. MHE was diagnosed in 79 (66.39%) patients. Anthropometric measurement like mid upper arm circumference (MUAC) was found to be significantly lower in MHE group than Non MHE group. A lower intake of food groups was found to be associated with poor nutrients intake and an increased risk for poor nutritional status in MHE group. The patients in MHE group were found to have poor score of MUST and SGA. Prevalence of malnutrition was found to be higher in MHE group, therefore nutritional intervention needs to be provided to avoid the risk of malnutrition and to prevent CLD patients to proceed towards overt MHE.

PHN-O-15

EVALUATING FOOD SECURITY OF MID DAY MEALS UNDER MDMS, SERVED IN SURAT CITY

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The mid day meal scheme, which has overcome many of the teething problems that enclosed it since its launch in 1995, has become an almost universal scheme, feeding primary school children all over the country. The objective was to evaluate the food security provided by Mid Day Meals and test the common charge on them of posing a major health hazard. A survey was carried out in 30 Municipal Schools of Surat City. An unannounced visit to primary school and Akshay Patra; an NGO managing Mid Day Meals followed interviewing headmasters, 10 randomly selected students from each school and workers of Akshay Patra. Total population constituted 300 students, 30 headmasters and 10 Akshay Patra workers. Quality was assessed by self examination carried out at the centralized kitchen taking into consideration sanitation and hygiene standard. 95% population positively responded towards regularity of meals served. 90% of the population was satisfied and said that they liked the food and the findings showed that the food was nutritionally adequate with reference to providing one third of the day's requirement assuming that the subject finished the amount of food served. The survey evidence points that 99% of the population never had any problems and this carries little weight against the enormous health gain that can be expected from better education and reduced hunger in the class room.

PHN-P-01

**HEALTH IMPACT OF POLYCYCLIC
CHLORINATED HYDROCARBON: ENDOSULFAN A
PESTICIDE**

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Endosulfan is a polycyclic chlorinated hydrocarbon insecticide that belongs to the cyclodiene group. It is one of the organochlorine compounds used extensively for the control of agricultural pests. Endosulfan residue has been identified in a variety of environmental media and its metabolites have been reported in human and domestic animals milk, fruits and vegetables. Endosulfan poisoning can be suspected in the presence of primary central nervous system manifestations including dysfunction such as liver failure. Endosulfan stores easily within the fatty tissues of living organisms. It was investigated the presence of α endosulfan, β endosulfan and its metabolites in fatty and non fatty tissue. The extensive use of endosulfan in the field of agriculture is a great alarm in the medical field also is because of their tremendous accumulating properties which are showing its much alarming effects in the years and years of generation. To date 62 countries have already banned the use of endosulfan which can be consider to be a big step in the way to protect people and their shared environment form this deadly chemicals.

PHN-P-02

**DEVELOPMENT OF GERIATRIC FOOD AND ITS
FUNCTIONAL POTENTIAL**

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AbhijitGanguli**

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Nutrition is an important determinant of health in persons over the age of 55. Malnutrition in the elderly is often under diagnosed. The decline in physiological and health functions makes the elderly develop some kinds of diseases. *Streptococcus thermophilus* RDT, a yoghurt bacteria as well as probiotic culture has been suggested for various forms of Geriatric deficiencies. The study was designed to explore the potential of *Streptococcus thermophilus* as yoghurt starter culture. Plain yoghurt was prepared in laboratory with optimized conditions of sodium alginate (1%) and inoculum (1%). The sensory, chemical and microbiological quality of yoghurt samples were investigated during refrigerated storage at 4° C for two weeks. In comparison to commercially available yoghurt, the titratable

acidity, pH, syneresis, stability of bacteria and shelf life was found more significant. Presence of Gamma-Aminobutyricacid (GABA) was also confirmed. The firmness improved with the addition of *Streptococcus thermophilus*. Exopolysaccharide (EPS) remain an interesting tool to modulate the sensory properties and stability of yoghurt. Extraction and quantification of Exopolysaccharide was performed. Production of EPS was quite significant (0.7979 mg/100gm of yoghurt). Nutritional analysis was also conducted in yoghurt sample. Presence of riboflavin, Calcium and Vitamin C was studied which satisfied the Recommended Dietary Allowance of Geriatric population. These results were encouraging and further large scale studies seem justified to establish the place of probiotic supplements in elderly subjects. Keywords: *Streptococcus thermophilus*, Geriatric, Exopolysaccharide, Yoghurt.

PHN-P-03

**IMPACT OF DIET RECOMMENDED IN
NATUROPATHY CENTERS ON THE NUTRITIONAL
STATUS OF ESSENTIAL HYPERTENSIVE
PATIENTS**

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The patient suffering from hypertension is now a day prefers to get them treated from naturopathy centers. Therefore the present study has been under taken to see the effectiveness of diet prescribed by naturopathy center on the nutritional and health status of the patients. In naturopathy center patient were doing meditation, *yoga*, sun, air water and mud therapy and were given hypo caloric diet. For the purpose of study 30 hypertensive male and equal numbers of female were selected from naturopathy center namely *Prakritik Jeevan Kendra, Pattikalyana, G.T. Road, Panipat and Navneet Prabhakar Yog Chikitsa Dham, Bassi, Jaipur, Rajasthan*. Weight,height,glycemic status and lipid profile was measured as well as BMI,WHR and nutrient intake was calculated before and after getting the treatment from naturopathy center. Treatment from naturopathy center was effective in reducing the weight (male 8.79; female 10.84 per cent) and BMI (from 25.16 to 22.95 in male and 28.07 to 25.065 in female). Percentage reduction as compare to RDA of carbohydrate, energy, protein and fat intake in male subjects was 39.3, 27.11, 46.24, 177.27 per cent. Corresponding values for female were 28.41, 40.46, 39.98, and 137.71 per cent. Contrary to the intake of carbohydrate , energy and fat , Vitamin C intake increased by six folds, Vitamin A turned twice ,iron intake too raised in both male and female subjects, because of this hemoglobin moved up significantly at both levels($P \geq .01$) and total cholesterol ,LDL,VLDL, Triglyceride and blood Glucose level decreased by 29.72,29.91, 16.74 and 46.66 percent. Corresponding reduction in female was 32.96 39.40, 17.6 520.24 and 49.91 percent. So, naturopathic treatment is a powerful weapon to combat obesity as well as

regulating the blood pressure, controlling lipid profile, maintaining and improving the nutritional status of the patients.

Key Words: WHR, BMI, LDL, VLDL, RDA.

PHN-P-04

ASSESSMENT OF NUTRIENT INTAKE AND FOOD CONSUMPTION PATTERNS OF NORTH INDIAN ADULTS

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Poor health affects both high and low income group people. Low income group people are at risk for under nutrition while high and middle income group people are at greater risk for obesity. Pilot study was conducted on 50 respondents of North India to study their nutritional status and food consumption pattern. Body mass index of respondents was less than 25. Data was collected using 24 hr recall method and values were calculated using Diet Soft Software. Data was analyzed using SPSS 20 version. Males were 42% and females were 58%. Mean age of the respondents was 23 years and their income was more than 1 lakh p.a. Intake of energy, protein, fat, calcium and zinc was significantly higher than RDA in both males and females. Intake of iron (18 mg) was less than RDA (21 mg) in females. Vitamin A was significantly less than RDA in both males and females. Among food consumption pattern intake of fruits and vegetables was significantly less than the recommended amount while intake of other food groups was much higher than recommended amount. Life style modification and nutrition education can help in improving the nutritional status of adults otherwise they will also suffer from lifestyle diseases in future.

Keywords: RDA, Nutrient intake, Food consumption, India,

PHN-P-05

TYPE II DIABETES: A COMMON LIFESTYLE DISEASE

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Lifestyle diseases are diseases that appear to increase in frequency as countries become more industrialized and people live longer. Type 2 diabetes, formerly known as adult onset diabetes, is among one of the major prevalent lifestyle diseases. According to International Diabetes Federation, in 2013, an estimated 381 million people had diabetes. Lifestyle related causes of diabetes include obesity, inactivity, smoking, and poor dietary habits.

Diet is a basic part of management in every case. Treatment cannot be effective unless adequate attention is given to ensuring appropriate nutrition. Core focus in diabetes care revolves around three basic principles of nutrition therapy which include, total energy balance, nutrient balance and food distribution balance. But diet, while critical to prevention, is just one risk factor. Physical inactivity is now recognized as an increasingly important determinant of health, is the result of a progressive shift of lifestyle towards more sedentary patterns. Stress management and treatment of anxiety or depression are also very important lifestyle related aspects associated with diabetes. Oftentimes they are overlooked because focus is so much on the food, exercise and medications. This shift in the pattern of disease is taking place at an accelerating rate in developing countries than it did in the industrialized regions of the world. This rapid rate of change, together with the increasing burden of disease, is creating a major public health threat which demands immediate and effective action.

Keywords: lifestyle disease, type 2 diabetes, nutrition therapy.

PHN-P-06

VISCERAL ADIPOSITY AND CANCER RISK

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According to the WHO estimates there were 1.5 billion overweight, 500 million obese adults in 2008, and nearly 43 million children under the age of five were overweight worldwide in 2010. An increase in total body fat is associated with an increased health risk, the amount of abdominal fat, particularly when located within the abdominal cavity, has been associated with an increased risk of comorbidities. Excess intra-abdominal adipose tissue accumulation along with dysfunctional subcutaneous adipose tissue expansion is often termed as visceral obesity. Three main pathophysiological mechanisms linking obesity and carcinogenesis include —insulin and the insulin-like growth factor-I, sex steroids and chronic inflammation and alterations in adipokines. Numerous epidemiological studies have already established that obesity is associated with increased risk of several cancers, including esophageal, thyroid, colon, renal, liver, rectum, gallbladder, lymphoma, and prostate in men; and postmenopausal breast- and endometrial cancer in women. The devastating epidemic proportions achieved by the obesity worldwide underscores the need for designing such programs so as to help individuals to rethink their nutritional and physical activity habits in a cost-effective manner in combination with the possible safe pharmacological approaches to target excess visceral/ectopic fat. While public health policies aimed at curbing the underlying causes of the obesity, there is a

parallel need to better understand the biological processes linking obesity and cancer for the development of new approaches to prevention and treatment.

PHN-P-07

DIETARY ASSESSMENT OF ADULTS USING FOOD FREQUENCY QUESTIONNAIRE

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A pilot study on 50 respondents of Delhi city was conducted to assess the habitual diet of adults using FFQ. Cereal foods, snack and confectionary, beverages, fats and sugar, pulses and legumes, vegetables, fruits, milk and dairy products, meat and fish, 8 groups were included in questionnaire. Face to face interview was taken and data was filled in FFQ. Categories like daily, twice a week, fortnightly, monthly, never, occasionally etc. were used and respondents had to choose one of these options. Descriptive qualitative information about food consumption pattern was provided by FFQ. The data presented in this study suggested that FFQ can be used as a method for evaluating food group intake of respondents.

Key Words: FFQ, Diet, Food groups, Delhi.

PHN-P-08

NUTRITIONAL IMPORTANCE IN AUTISTIC CHILDREN

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Autism is a polygenetic developmental neurobiological disorder with multiorgan system involvement; though it predominantly involves central nervous system dysfunction it has a broad impact on cognitive and neurologic functioning. Since the prevalence of autism is surging by 2020, 10 per cent of the population is expected to suffer from autism, poised to make India most populous country in terms of autistic patients across the globe, which makes fresh strides in autism research more relevant to India. As the prevalence rate increases, the resulting costs of this lifespan condition on national economics would rise concurrently. In countries such as India, these costs could cripple the nation's health. Autism has become one of the most difficult and controversial child health issues because of controversies over etiology and the effectiveness of interventions. Mood and behaviour problems in humans have been linked to a lack of omega-3 EFA in the diet. Poor digestion often encountered in autistic subjects may

be due to environmental factors, genetic susceptibility, inflammation and immune system response to certain foods and low levels of beneficial flora. The above factors can affect the brain, causing foggy thinking- affecting attention, language and learning. Dietary intervention is the cornerstone in the treatment of autism. Making calculated omissions and additions to food choices is the first step in improving autistic children's health and well being. Certain food substances are known to be problematic and should be avoided and other foods rich in healing nutrients are beneficial when added to children's diets. Various nutrients have been found to be beneficial for the autistic children; ω -3-fatty acids have been found to be one of the nutrients with diverse health potential for autistics. Identifying food sensitivities and removing all potential allergens to minimize challenges to the child's delicate immune system has been proven to be helpful for many autistic children.

PHN-P-09

SELF-HEATING READY-TO-EAT FOODS: AN INNOVATIVE PACKAGING TECHNIQUE

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Self-Heating Food Packaging (SHFP) is a type of active packaging that specifically refers to packaging with the ability to heat the food contents without the need for external heat sources or power. Other types of active packaging are self-cooling food packaging and radio-frequency identification (RFID). Packages like self-heating foods have been typically used by the military during operations when it is unsafe to have a fire to cook. Commercial heat engines for self-heating food packaging involve an exothermic reaction between quicklime / calcium oxide and water, which generates a heat output of approximately 60 calories per gram. Quicklime, inexpensive and readily available, is generally recognized by the FDA as safe. The by-product of the reaction is calcium hydroxide. In meals ready to eat (MREs) or the flameless ration heater alloy of magnesium and iron are used. Magnesium is chosen because it is readily oxidized, which is due to its having only two electrons in its valence shell. The magnesium metal is mixed together with a small amount of iron. To activate the reaction to heat the food, a small amount of water is added, and the boiling point of water is quickly reached as the reaction proceeds which generate a heat output of approximately 310 calories per gram and hydrogen is released as a by-product. Self-heating food containers, popularly known as "Kitchen in Carton" are designed to heat and eat-on-move. The exothermic chemical reaction works by the process of oxidation-reduction, which is similar to the process of rusting metals.

Keywords: Active packaging, exothermic, flameless ration heater, oxidation-reduction, electrons, valence shell.

PHN-P-10

BARIATRIC NUTRITION - A WAY TO MANAGE OBESITY

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Bariatrics is the branch of medicine that deals with the causes, prevention, and treatment of obesity. The term bariatrics was created around 1965. Bariatric surgery (weight loss surgery) includes a variety of procedures performed on people who are obese. Weight loss is achieved by reducing the size of the stomach with a gastric band or through removal of a portion of the stomach (sleeve gastrectomy or biliopancreatic diversion with duodenal switch) or by resecting and re-routing the small intestines to a small stomach pouch (gastric bypass surgery). Long-term studies show the procedures cause significant long-term loss of weight, recovery from diabetes, improvement in cardiovascular risk factors, and a reduction in mortality of 23% from 40%. However, a study in Veterans Affairs (VA) patients has found no survival benefit associated with bariatric surgery among older, severely obese people when compared with usual care, at least out to seven years. The U.S. National Institutes of Health recommends bariatric surgery for obese people with a body mass index (BMI) of at least 40, and for people with BMI 35 and serious coexisting medical conditions such as diabetes. However, research is emerging that suggests bariatric surgery could be appropriate for those with a BMI of 35 to 40 with no comorbidities or a BMI of 30 to 35 with significant co-morbidities. The most recent ASMBS guidelines suggest the position statement on consensus for BMI as indication for bariatric surgery. The recent guidelines suggest that any patient with a BMI of more than 30 with co morbidities is a candidate for bariatric surgery. Key Words: obesity, bariatric nutrition, BMI, bariatric surgery etc.

PHN-P-11

EDIBLE UTENSILS: ECO FRIENDLY FUTURISTIC APPROACH

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The world is becoming more and more conscious of littering and has started using disposable waste products that do not contaminate the earth thereby saving the environment from pollution. While a number of bio degradable

and environmentally responsible packaging material flood the market has anyone ever thought of finishing off his plate along with the food on it. A new concept that of 'Taste no Waste' has emerged with edible material in order to design eco friendly food containers, utensils like plates, forks, knives and spoons which is a unique futuristic idea of minimizing waste and not burdening the environment. The notion of being able to eat your plate and spoon is appealing and provided a perfect recycling process. It is simply beautiful with the edible containers not containing any kind of preservatives, artificial coloring or sugar but vegetables which come loaded with health benefits. Vegetable pulp - spinach, beetroot and carrot - were used to add colour and nutritive value to it. The objective of this review is to provide introduction, uses and advantages of eco friendly edible utensils.

Keywords: Bio Degradable, Eco Friendly, Edible Utensils, Futuristic.

PHN-P-12

CONSUMER AWARENESS TOWARDS PESTICIDE RESIDUES AND SOURCING PRACTICES: CEREALS AND PULSES

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A random selection of household women was done from rural and urban areas of district Ludhiana (Punjab). The respondents were enquired about their awareness regarding pesticide residues and their sourcing practices related to cereals and pulses and their products. The results of the study revealed that the respondents were having good awareness level regarding pesticide residues, their presence in cereals and pulses, health impacts associated. The statements framed to perceive the knowledge received a score above 3 for both rural and urban respondents indicating good awareness level. Majority of the household women were aware of food safety and were in agreement with the statement that safety from pesticide residues is necessary with mean scores of 3.75 and 4.43 for rural and urban respondents respectively. Sourcing practices of the rural respondents revealed that cereals were mostly home-sourced and none of the respondents outsourced them. Sourcing practices of pulses and its products were found to be quite different from flour in the urban household women of the three income groups. Majority of the cereals and pulses were outsourced by the urban respondents. Also it was found that the urban respondents preferred buying packed food more than their rural counterparts.

Keywords: Food Safety, Pesticide residues; Awareness, Food Sourcing Practices.

PHN-P-13

FOOD SAFETY KNOWLEDGE, AND HYGIENE PRACTICES AMONG THE STREET FOOD VENDORS IN NAMAKKAL CITY, TAMILNADU

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Street food vending is a prevailing and distinctive part of a large informal public sector in both developed and developing countries. Food safety is a key public health concern, because a large number of people take their meals outside from home and are exposed to food borne illnesses. Food handlers play an important role in ensuring food safety throughout the food chain of storage, processing production, preparation and retailing. The objective of the study is to assess the level of knowledge and practice of food safety among the food vendors in Namakkal City, Tamilnadu. A cross sectional study was conducted among the street vendors in Namakkal City. A total of 50 street food vendors were selected using non-probability sampling technique. Data were collected through face to face interview using a developed questionnaire. All completed questionnaires were validated manually and data analysis carried out by computer using SPSS software package. Multinomial regression analysis revealed that age and ethnicity appeared to be important factors for food safety knowledge ($p < 0.05$), whereas food safety knowledge and training appeared to be influencing factors for attitude ($p < 0.05$). On the other hand, food safety knowledge, attitude and age of the food vendors influence the food safety practice, but duration of food vending had an inverse relationship with food safety practice ($0 < 0.05$). Findings of this study may help in planning health intervention programs for food handlers for their improvement of knowledge, and practice towards food-borne diseases and food safety. Furthermore, this will in turn eradicate the morbidity and mortality of food-borne diseases. Keywords: Attitude, food safety, knowledge, practice.

TECHNICAL SESSION II

FOOD PROCESSING AND TECHNOLOGY (FPT)

FPT-O-01

UTILIZATION OF APPLE POMACE FIBRE FOR THE PREPARATION OF FIBRE ENRICHED APPLE JUICE

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Apple juice beverage was prepared by reconstituting the apple juice concentrate (74°B) to 13°B by adding water. To the apple juice, varying proportions of pomace fibre i.e. 2, 4 and 6% was added and evaluated. The beverage containing 4% fibre was selected and carboxymethyl cellulose (CMC) at different proportions (0.6, 1.2, 1.8, 2.4 and 3.0%) was added. 1.8% CMC and 4% apple fibre at TSS of 13°B was adjudged the best with respect to better appearance and mixing and hence optimized. Similarly, suitability of adding isabgol (*Plantago ovata*) fibre was evaluated. A beverage containing 0.5% isabgol was found equivalent to 4% apple beverage with respect to appearance and consistency. Apple juice recorded TSS of 13.08° Brix, titratable acidity 0.29%, 6.62% total sugars, 7.354 relative viscosity and a total solids of 17.82% while isabgol fibre juice recorded TSS of 13.00° Brix, titratable acidity 0.29%, total sugars 7.14%, 7.709 relative viscosity and 15.18% total solids. Apple juice had an overall acceptability score of 6.56 as compared to 6.12 of isabgol enriched apple juice. Keywords: Beverage, Isabgol, Apple, Carboxy methyl cellulose, Fibre.

FPT-O-02

CURRENT TRENDS: GREEN TECHNOLOGIES IN FOOD PRODUCTION AND PROCESSING

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Green technology is the application of one or more of environmental science, green chemistry, environmental monitoring and electronic devices to monitor, model and conserve the natural environment and resources, and to curb the negative impacts of human involvement. Food is an integral component of life and human existence. Since the beginning of time, humans have had to eat to survive. In earlier times when human population was much smaller, resources were abundant and there was less need for food processing and storage. As populations grew, limitations in food processing and storage techniques forced more individuals to devote considerable amounts of time daily to feeding themselves and their families. Industrialization shifted a large percentage of the population toward a myriad

of activities creating the need for an industrialized food sector to feed an increasing number of urbanized humans. Finding a balance between food supply and demand in a manner that is sustainable and which ensures the long-term survival of the human species will be one of the most important challenges for humankind in the coming decades. Environmental concerns related to food production and processing which require consideration include land use change and tremendous reduction in biodiversity, aquatic eutrophication by nitrogenous and phosphorus substances caused by over-fertilization, climate change, water shortages due to irrigation, ecotoxicity, and human effects of pesticides, among others. Keywords: Environmental monitoring, Food, Industrialization, biodiversity.

FPT-O-03

EFFECT OF SOLAR TUNNEL AND FREEZE DRYING TECHNIQUES ON THE ORGANOLEPTIC ACCEPTABILITY OF PRODUCTS PREPARED INCORPORATING OKARA (SOY BY-PRODUCT)

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Okara, a by-product of soymilk and tofu manufacturing, is potentially a nutritious product high in protein, carbohydrates, vitamins, minerals and fat and fibre. Many Asian countries have found a variety of ways to make use of okara in many food items and several studies have been conducted on different processing, cooking methods and development of value added products of soybean but still information is lacking on the effect of drying techniques on the acceptability of value added extruded, baked and fried products incorporating okara. An attempt has been made in the present investigation to observe the effect of solar tunnel drying and freeze drying techniques on the organoleptic acceptability of products developed by incorporating okara which was extracted, processed (dried) and powdered from PS-1347. Five products namely chocolate cinnamon doughnuts, macroni, cake-rusk, noodles and butter cookies were prepared by incorporating various proportions (10, 20 and 30 per cent) of processed okara and it was observed that noodles, macroni and cake rusk of freeze dried okara were most acceptable at 30% level and fell in the category between liked moderately and liked very much by having 7.9, 7.7 and 7.6 overall mean scores, respectively. Whereas, chocolate cinnamon doughnuts and butter cookies prepared by substituting 20% solar tunnel dried okara were found most acceptable by having 7.5 and 7.8 mean scores, respectively.

FPT-O-04

STANDARDIZATION OF A PROCESS FOR THE MANUFACTURING OF A HEALTHY DATE BAR

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Healthy date bar was formulated by using date palm, apricot, almonds and peanut butter. There was no use of sugar and preservatives. Dates and apricot were pitted manually. Then the Paste of dates was formed by grinding. Dates were used as the main ingredient to provide taste and health benefits. Then the different levels of ingredients were used to form a healthy date bar. A statistical tool was applied to optimise the process of manufacturing the date bar. Date bar with the moisture content of 13.8% (d.b) had 3.0% protein, 73% carbohydrates, 3.9% fat, 5.2% edible fibre and 2.13% ash. Moreover, textural and sensory analysis was also done to determine the physical acceptability of date bar.

FPT-O-05

EFFECT OF PROCESSING TECHNOLOGIES ON NUTRITIONAL QUALITY AND COMPONENTS OF FUNCTIONAL FOODS

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A food can be regarded as functional if it is satisfactorily demonstrated to affect beneficially one or more target functions in the body beyond adequate nutrition, in a way that improves health and well being or reduces the risk of disease. The ultimate goal in the processing of food materials has been traditionally to the need for controlling microbial population that may become a threat to public safety. The present study was intended to develop functional food products i.e., Health mix and fibre rich cookies and to examine the processing effects on nutritional quality and functional components. The ingredients for health mix and cookies were subjected for various trails and subjected to sensory evaluation. The trail which was most acceptable by the selected panel members was considered as standardized product. The products which were standardized were analyzed for nutritional and functional components. The results showed that after processing there was no significant effect on fibre content. There was a significant increase in carbohydrate, poly unsaturated fatty acids, but the total anti oxidant, crude protein, isoflavones content was decreased. It can be concluded that the processing may affect the functional components to some extent and on other hand it may also improve the quality and quantity of the nutrients after processing. Hence appropriate processing technologies

have to be chosen for development of functional food products to retain the functional components.

FPT-O-06

**FIBRE RICH VEGETABLE CRUNCHIES –
STANDARDIZATION AND DEVELOPMENT**

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Fibre is a component of the normal diet and is widely recognized as being an important part of healthy nutrition. Guar gum is water soluble fibre acts as a bulk-forming laxative, so is claimed to be effective in promoting regular bowel movements and relieving constipation and chronic relative functional bowel ailments. Snack is a portion of food often smaller than a regular meal, generally eaten between meals. Snacks come in a variety of forms including packaged and processed foods and items made from fresh ingredients at home. Now a day's consumers are becoming more health conscious and choosing healthy foods even at snack time. Hence, an attempt was carried out to develop vegetable crunchies by incorporating guar gum. Three trails with 5 gm, 10 gm and 15gm of guar gum variation were carried out to standardize the fibre rich vegetable crunchies. The crunchies developed were subjected to sensory evaluation by using hedonic scale with selected panel. Crunchies developed with 15 gm guar gum was more acceptable by the panel. The trail which was most acceptable by the selected panel members was considered as standardized product. The nutrient composition was assessed and the marketing potentials were tested with test marketing. Vegetable crunchies were well accepted by the consumers hence can promote the product as healthy snack food.

FPT-O-07

**PROCESSING AND ASSESSMENT OF QUALITY
CHARACTERISTICS OF CORN-PEANUT FLAKES**

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Rajkumari, Kour Harleen, Chauhan
Harmeet, Gupta Prerna and Naseer
Ahmad**

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University of Agricultural Sciences & Technology of
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The study examined proximate composition, anti-nutritional compounds and organoleptic attributes of flakes based on corn and peanut for possible use as ready to eat food. The product was prepared as per the standard protocol to ascertain changes in physico-chemical and sensory characteristics. The flakes were prepared from corn - peanut blends in the ratios of 100:0, 90:10, 80:20 and 70:30. The

analysis of flakes revealed significant differences among different blends. On basis of sensory evaluation the flakes prepared from germinated corn flour: roasted peanut flour of (80: 20) attained highest overall acceptability score (8.57±0.01) and it contained 9.94 ±0.04 % crude fat, 16.24 ±0.04 % crude protein, 2.56 ±0.01% crude fibre, 3.12±0.02% ash, 64.27±0.07% carbohydrate content and 2.92±0.01 mg/100g β-carotene. The results obtained in this study also showed that flakes prepared from germinated corn flour: roasted peanut flour of (80: 20) contained 14.60±0.01 mg/100g calcium, 0.86±0.01 mg/100g zinc and 0.73±0.01 mg/100g iron.

FPT-O-08

**STEEPING PRESERVATION OF FRESH BUTTON
MUSHROOMS**

**Gupta Prerna, Bhat Anju, Kaul
Rajkumari, Chauhan Harmeet, Malik
Anisa Anjum, Kour Harleen, and Naseer
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Jammu.

A study was conducted to evaluate the shelf-life of fresh mushrooms by preserving them in steeping solution containing NaCl+ KMS+ Citric acid and Tartaric acid in the ratio of 2%, 0.1%, 0.1% and 0.3%. Moreover the ratio of mushroom to solution will be 1:3. The results showed that shelf-life of mushrooms can be enhanced upto 60days without any effect on quality and are microbiologically safe and the pH of the solution will be 3.37. On the basis of sensory evaluation the above treatment can be used for preserving the quality of fresh mushrooms at room temperature in glass jar bottles.

FPT-O-09

**DEVELOPMENT AND QUALITY EVALUATION OF
A LOW FAT MILK BASED READY TO EAT CRISP
PRODUCT**

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Milk is known for its nutritional and therapeutic values and other health benefits and it is a widely accepted livestock product in worldwide food culture. India ranks first in the world with an annual milk production of 127.9 million tons in 2011-12 and per capita availability of milk has increased from 128 g/day in 1980-81 to 290 g/day in 2011-12 (Department of Animal Husbandry, Dairying and Fisheries, GOI, 2014). Milk produced in the country is being

used mainly in liquid form and for the processing of traditional milk products. Changes in socio-economic structure have emphasized the convenience as important factor in every sphere of life including the food. To days' consumer is aware and health conscious and is in search of healthy products in the market. In view of this scenario, the present research work was conducted to develop a novel milk based snack product. It is a healthy, low fat, high protein, shelf stable, ready to eat crisp product. Series of experiments were conducted to standardize the formulations and processing conditions. Two basic formulations were standardized using ingredients like s. milk coagulum, binders and other ingredients. Sensory evaluations were conducted on eight point hedonic scale which showed good to very good acceptability of the products. Analysis of composition of the products showed that the moisture, protein and ash content were in the range of 7.28 to 8.75%, 27.34 to 32.61% and 3.74-5.23% respectively.

FPT-O-10

OIL BLENDING: AN APPROACH TO BALANCE OUT FATTY ACID COMPOSITION

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India is third ranker in oilseed production but the prime concern is that the availability of edible oil in our country has been decreasing day by day. Its production from commercial oilseed crop like mustard, sesamum, cottonseed, sunflower etc, is not sufficient to meet out the demand for increasing population of the country. So there is continuous search to look for new and easily available source of edible oil. Hence oil from non- traditional, non oilseed sources like rice bran have great prospects in bridging the demand and supply gap. To make available good quality edible oils at reasonable price is one of the national objectives. Consumer may not prefer non conventional edible oils as they are devoid of any originally preferred flavor of oils traditionally consumed in the country. Moreover, acceptability, keeping and nutritional quality of the non conventional edible oil could be brought to desired level by suitable blending with other vegetable oils. Fatty acid composition and functional properties can be improved by blending of different oils. It modifies fatty acid composition of oils without any chemical or biological process also introduces some antioxidants to oil and it is a post harvest technology that if done carefully would not only fill up the demand and supply gap but may also provide nutritional and industrial benefits,. Blending can improve oxidative stability of oils and provide nutritionally superior low cost edible oil (blends) that meet the international standards recommended by health agencies. Also evidence suggests that no single oil can provide the recommended dietary fat ratio. Thus, blending of non conventional oil like palm oil, rice bran oil, and sunflower oil, sesame oil with traditional oil like

groundnut oil to make stable and healthier blended oil can be done at reduced cost.

FPT-O-11

PERFORMANCE OF KINEMATIC HALF-TURN NUT PANEER PRESSING MECHANISM FOR MEDIUM SCALE APPLICATIONS

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Paneer prepared by traditional pressing mechanisms suffers in qualities, namely- moisture content, hardness, density. Due to rising demand of uniform quality *paneer*, various *paneer* pressing mechanisms (pneumatic, kinematic half-turn nut, screw pressing mechanisms) were developed for small-scale applications but kinematic half-turn nut (KHTN) pressing mechanism was the simplest one and showed promising results in relation to quality attributes. Due to the promising results of lower version, a scaled-up model was designed and developed for medium scale (5-20) applications. To evaluate the performance of the scaled-up model six sets of batch capacity 8.0, 12.0, 15.0, 16.0, 17.0, 20.0 litres and six sets of static pressure 2.0, 2.8, 3.4, 3.6, 3.8, 4.4 kg/cm² were used for preparation of *paneer*. Samples from different layers (top layer, middle layer and bottom layer) of *paneer* block were analyzed for moisture, hardness, density and sensory attributes. The average moisture content (wet basis), hardness, density and sensory score in *paneer* varied from 51.52 to 54.32%, 33.48 to 39.01 N, 1017.15 to 1039.29 kg/m³ and 7.21 to 8.06 respectively among different batch capacities. Up to 15 litres batch capacity it was able show similar type results as lower version and performances were suitable for medium scale applications. Keywords: *Paneer*, Pressing Mechanism, Kinematic Half-Turn Nut, Design.

FPT-O-12

DEVELOPMENT AND EVALUATION OF CEREAL AND LEGUME BASED SUPPLEMENTARY POWDER

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The study evaluated the effectiveness of substituting different concentrations (5, 15 and 25%) of legume flour (chickpea and soybean) on the functional, physico-chemical and sensory properties of supplementary powder. The

substitution of chickpea and soy bean flour significantly ($P \leq 0.05$) increased the bulk density and water solubility index, with the highest value of 0.83g/ml and 56.62 recorded in T₅ (25:25:25:25: MBF: MWF: MSF: MCF). The highest protein, ash and moisture content of 20.17, 3.62 and 8.31% was recorded in T₅ (25:25:25:25: MBF: MWF: MSF: MCF). Crude fibre content of 5.85% was highest in T₁ (100:0:0:0: MBF: MWF: MSF: MCF) whereas, the highest crude fat of 8.62% was observed in T₁₀ (25:25:25:25: RBF: RWF: RSF: RCF). The highest calcium, zinc and iron content was recorded in T₅ (25:25:25:25: MBF: MWF: MSF: MCF). Sensory evaluation revealed that T₈ (45:45:5:5: RBF: RWF: RSF: RCF) scored highest of 8.37.

Keywords: bulk density, water solubility index, supplementary, functional properties, MWF- Malted wheat flour, RWF-Roasted wheat flour, MBF- Malted barley flour, RBF- Roasted barley flour, MSF- Malted soybean flour, RSF- Roasted soybean flour, MCF- Malted chickpea flour RCF- Roasted chickpea flour .

FPT-O-13

THE PREPARATION OF FROZEN YOGHURT BY THE ADDITION OF GRAPES AND ORANGE

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The present study was undertaken with the objectives for preparation of frozen yoghurt, to assess the feasibility of using Grapes and Orange pulp, to optimize level of fat replacement in frozen yoghurt, to evaluate the organoleptic quality, chemical quality, microbiological quality of frozen yoghurt and cost of the production. Six different treatments and control were used in the ratio (100:0, 95:5, 90:10, 85:15, 95:5, 90:10 and 85:15) for frozen yoghurt making, indicated as T₀, TG₁, TG₂, TG₃, TO₁, TO₂ and TO₃ respectively. Six treatment combinations were used in the study and replicated four times. The product was analyzed for organoleptic attributes like (Flavour and taste, Body and texture, colour and appearance) by trained panelist using 9-point hedonic scale, physico-chemical characteristics (Moisture, Fat, Protein, Carbohydrate, Total solids, Acidity and Ash) and microbiological (Yeast and mould, Coli form). The treatment TG₂ (90 % Yoghurt: 10 % Grapes pulp) was found best for Frozen yoghurt making in comparison to other treatments in the organoleptic characteristics. Thus as far as product acceptability judged by organoleptic evaluation value is concern, the treatment can be rated is TG₂ > TG₃ > TG₁ > TO₁ > TO₂ > TO₃.

FPT-O-14

EFFECT OF STORAGE ON PHYSICO-CHEMICAL PROPERTIES OF BLENDED RADISH (*RAPHANUS SATIVUS*) JUICE

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Radish (*Raphanus sativus*) is a native root crop of Europe and Asia. The winter season crops, radish, carrot, tomato and beet root were selected for the juice preparation and blends were prepared by altering the ratio. Control and blended samples were stored under refrigeration condition and evaluated for the effect of storage on physico- chemical properties at the interval of 15 days. Maximum juice was recovered from carrot followed by radish, tomato and beet root. After 45 days of storage foul smell was observed in the samples. The blended samples were best during storage and scored maximum in sensory evaluation. Beet root juice blended sample had the highest content of total solid, pH and viscosity. The acidity was the highest in tomato juice blended samples. Ascorbic acid content was observed highest in control radish sample and decreased with the blending with other juices. Ascorbic acid content was lowest in case of samples blended with the carrot juice. The tannin content was very high in control sample and decreased with blending of carrot juice and tomato juice but increased with blending of beet root juice as tannin content was high in beet root. Total sugar content, reducing sugar and non- reducing sugar content was recorded the highest in samples blended with beet root juice and carrot juice. The control had lowest level of total sugar, reducing sugar and non- reducing sugar. Colour of control juice sample was very dull. The change in pH, total soluble solids and acidity was not significant. Tannins content, reducing sugar showed increase in their concentration. Total sugar, non- reducing sugar and ascorbic acid content showed gradual decrease. It was concluded from the study that radish juice blended with carrot juice was best in acceptance and other physico- chemical properties followed by blended with beet root juice and tomato juice.

Key words: Radish, juice, ascorbic acid, total sugar.

FPT-O-15

IMPACT OF FOOD PROCESSING ON QUALITY

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Processing (including preparation) makes food healthier, safer, tastier and more shelf- stable. While the benefits are numerous, processing can also be detrimental, affecting the nutritional quality of foods. Blanching, for example, results in leaching losses of vitamin and minerals. Also, milling and extrusion can cause the physical removal

of minerals during processing. The nutritional quality of minerals in food depends on their quantity as well as their bioavailability. The bioavailability of key minerals such as iron, zinc and calcium is known to be significantly affected by the various processing methods including milling, fermentation, germination (sprouting), extrusion, and thermal processing. Vitamins, especially ascorbic acid, thiamin and folic acid, are highly sensitive to the same processing methods. The time and temperature of processing, product composition and storage are all factors that substantially impact the quality status of foods.

FPT-O-16

EMERGING POSTHARVEST TECHNOLOGIES FOR FRUITS AND VEGETABLES

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India is the second largest producer of fruits and vegetables and has tremendous potential in the fruit and vegetable processing sector. Significant change has also been observed in the fruits and vegetables processing industry in last few decades and a number of newer postharvest handling technologies have emerged in recent years. These include both thermal and non-thermal methods of processing as well as newer storage and packaging techniques. Thermal methods include microwave heating/drying, infrared processing, ohmic heating etc., whereas, irradiation, high pressure, pulsed electric field, ultra sound, ozonation, pulsed magnetic field processing etc. form the non-thermal methods of processing. Shelf life of fresh fruits and vegetables have been significantly enhanced during storage and transportation using modified atmosphere packaging and controlled atmosphere storage protocols which enabled fresh fruits and vegetables to reach the international market. Moreover, development of active packaging materials has provided added advantage in the shelf life extension of fresh as well processed food products during storage. These technologies are only in budding stage in India and more focus is needed in this area as adaptation of these newer technologies will definitely help the Indian fruit and vegetable processing to compete in the changing international market.

FPT-O-17

ENHANCING NUTRITIONAL VALUE OF EXTRUDED PRODUCTS THROUGH VEGETABLE AND FRUIT POWDER

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It is well known that extrusion is not a single process it is a combination of several unit operations which includes mixing, cooking, kneading, shearing, shaping and forming. Extrusion technologies have an important role in the food industry as efficient manufacturing processes. It has gained popularity due to its versatility, cost effectiveness, product quality, productivity and because it is eco-friendly. Extrusion cooking technologies were and are still being used basically for cereal and protein processing in the food industry, pet foods and feeds sectors. But as, there is a global trend towards the development of healthy snacks, the incorporation of fruits and vegetables in extruded snacks represents a strategy to increase consumption of this food group while greatly increasing the nutritional value of snacks in the present era. The present article focuses a light on the history and new trends regarding the use of vegetables and fruit powder in the extruded food products in order to increase their micronutrient values.

Key words: extrusion, unit Operations, vegetable and fruit powder, micronutrient.

FPT-O-18

EFFECT OF EDIBLE AND ALOE VERA BASED HERBAL COATINGS ON QUALITY AND SHELF LIFE OF FRUITS AND VEGETABLES: A REVIEW

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Fruits and vegetables continue to respire after harvest. A way for minimizing these problems is to coat the individual fruits and vegetables and to provide a protective film for prolonged freshness. Apple coated with emulsion consists of sodium caseinate and glycerol stored at 4⁰C can extended the shelf life with better quality up to 112 days. Gelatin, Carboxy-methylcellulose and soy protein isolate edible films showed more encouraging results in case of sweet cherries during 2⁰C storage in terms of moisture loss, fruit soluble solids content and Titrable Acidity. Chitosan coatings combined with zeolite and Tween80 delayed the ripening of tomatoes and no sign of fungal decay was observed during 37 days storage at 10⁰C. Recently, there has

been increased interest in using Aloe Vera gel as an edible herbal coating. In case of Papaya, the aloe vera coated fruits survived the storage period of 15 days at low temperature whereas all the uncoated controls decayed within 10 days. When studies were done of Grapes, it was found that the storability could be extended up to 35 days at 1 °C. Tomato in control showed a rapid deterioration with an estimated shelf life period of 19 days, based on the mass loss, colour changes, accelerated softening and ripening. On the contrary, Aloe Vera coated tomatoes delayed the ripening and extended the shelf life up to 39 days. Thus, Edible and Aloe Vera based herbal coatings would be an innovative and interesting means in improving the quality and shelf life of fruits and vegetables and reducing post harvest losses.

FPT-O-19

EFFECT OF POULTRY HOUSE MICRO CLIMATE ON EXTERNAL AND INTERNAL QUALITIES OF EGGS PRODUCED BY COMMERCIAL LAYING HENS

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An experiment was conducted using 36 weeks old white leg horn egg laying hens (n=504) reared in four tier cage system to study the influence of microclimate existing inside the poultry house on the quality of eggs produced. The birds were randomly distributed into 72 replicates and reared in environment controlled house facility at 29°C and the environmental temperature was increased gradually to 37°C @ 1°C per day for 8 days. The mean THI was 82.51 during the experimental period. Body weight of all the birds and external and internal qualities of eggs (n=72) were recorded before and at the end of the experimental period. There was 3.8 % decline in body weight of birds in eight days period. The external quality of eggs viz. egg weight, shape index, specific gravity, egg shell breaking strength did not differ. The internal quality of eggs such as haugh unit (72.97± 0.89 vs 102.63±0.55) and albumin index (0.062±0.001 vs 0.116±0.002) were lowered due to high environmental temperature. However, the other internal quality parameters such as egg shell weight, shell thickness, yolk index, yolk weight, colour and yolk percentage, albumin weight and percentage did not vary significantly. From this study, it can be inferred that high environmental temperature inside the poultry house deteriorates the internal quality of eggs produced during summer season.

Key words: Environment controlled house – egg laying hens – egg quality.

FPT-O-20

CARCASS QUALITY OF BROILER CHICKEN REARED UNDER ENVIRONMENT CONTROL CHAMBER FACILITY AND OPEN SIDED CONVENTIONAL POULTRY HOUSE DURING SUMMER SEASON

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A study was conducted to assess the carcass quality of broiler chicken reared under automated environment control chamber facility and open sided conventional poultry house during summer season. A total of 1200 numbers of one day old commercial broiler chicks were allotted to 4 treatment groups with 20 replicates per group. The temperature and humidity inside the environment controlled chamber for T₁ group was 33 °C with 60 % RH, T₂ group was subjected to gradual reduction in temperature @ 3°C per week from 33 °C to 24 °C with 60 % RH and T₃ group birds were reared at a temperature of 24 °C with 60 % RH and T₄ group birds were reared in open sided conventional poultry house with mean THI of 79.2. A total of 48 birds (12 birds per treatment) were slaughtered at the end of the trial to evaluate the carcass characteristics. Weight of skin (6.42±0.34) and liver (2.15±0.10) as percentage of body weight was significantly high (P<0.05) in T₃ group. The weight of cut up parts is expressed as percentage of carcass weight. The leg weight (28.01±0.42) was more (P<0.05), and the weight of wings (6.98±0.83) was low (P<0.05) in T₃ group as compared to T₁ (27.34±0.41 and 10.85±0.21) and T₂ (26.56±0.52 and 10.92±0.50) groups, respectively. However, chiller loss percentage (4.60±0.65) was more (P<0.05) in T₃ group compared to T₁ (2.88±0.56), T₂ (2.03±0.70) & T₄ (2.77±0.46) group of birds. Based on the results obtained, it can be inferred that the carcass quality of birds reared under environment control chamber facility at 24°C with 60% RH was found to be better compared to the birds reared at high environmental temperature during summer season. Key words: Environment controlled house facility - broiler chicken performance – carcass quality – summer season.

FPT-O-21

DETECTION OF PALM OLEIN AND SHEEP BODY FAT ADULTERATION IN GHEE USING NORMAL AND REVERSE PHASE THIN LAYER CHROMATOGRAPHY

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A study was carried out to detect palm olein and sheep body fat, when adulterated individually in cow and buffalo ghee @ 5, 10, 15% (v/v) by using normal and reverse phase thin layer chromatography (TLC). Unsaponifiable matter (USM) extracted by using hexane after saponification of fats/oils with methanolic potassium hydroxide and made alkali free by washing with water, followed by evaporation of the solvent and dissolution in chloroform, was spotted on TLC plates, along with some reference standards of sterols (cholesterol, cholesterol acetate, phytosterols), β -carotene and tocopherols. Plates were developed by using solvent system (cyclohexane:ethyl acetate:water::600:200:1,v/v for normal phase and petrol ether: acetonitrile: methanol::1:2:2, v/v for reverse phase). Palm olein was easily detected even at the level of 5%, in both types of the ghee studied, by getting three extra spots or bands in the reference area of tocopherols as compared to pure samples for normal phase chromatography. Using reverse phase chromatography, extra spot of β -sitosterol in palm olein adulterated milk fat samples can be used as marker for detecting adulteration, while buffalo depot fat didn't show any additional spots in comparison to pure samples of cow and buffalo ghee using both normal phase and reverse phase chromatography.

FPT-P-01

EFFECT OF DIFFERENT PARTS OF TOMATO ADDITION ON SHELF LIFE ENHANCEMENT OF GHEE

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Ghee (from Sanskrit ghita meaning "sprinkled") is clarified butter and by far the most important product widely consumed in the Indian sub-continent. According to FSSAI (2006) "Ghee" means the pure clarified fat derived solely from milk or curd or from desi (cooking) butter or from cream to which no colouring matter or preservative has been added. Ghee has been considered immensely superior to other fats mainly because of the presence of characteristic short chain fatty acids, carrier of four fat-soluble vitamins viz., A, D, E, K and essential fatty-acids such as linolenic

acid and arachidonic acid and under Indian conditions because of poor storage and transport facility, substantial amount of fat rich dairy products are spoiled due to off flavour development. Since ghee is a fat rich product, therefore antioxidants play a major role in preventing rancidity. Chemical antioxidants have been in use to prevent rancidity and enhance the oxidative stability of ghee but they have carcinogenic effect. In recent years consumers have become more concerned about the health risks of such antioxidants and are looking for products having antioxidants from natural source. Tomato as a whole has potential health benefits because of the plethora of compounds present in it. In the present study, a different part of tomato viz., skin, pulp and paste of Globe variety of tomato was incorporated into ghee. The ghee samples were subjected to accelerated storage at $80^{\circ}\text{C}\pm 2^{\circ}\text{C}$ for 15days. The samples were evaluated for flavor score, analyzed for peroxide value, FFA value, TBA value and free radical scavenging activity to investigate the extent of oxidation in the samples. The results suggested that skin obtained from Globe variety of tomato skin when added @0.4% by weight of ghee, had significant effect in enhancing the oxidative stability of ghee. Therefore tomato skin which is a byproduct of food industry can be used as a natural source of antioxidant for enhancing the shelf life of ghee.

FPT-P-02

EDIBLE FILMS AND COATINGS: AN INTELLIGENT PACKAGING IN FOOD PROCESSING INDUSTRY

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Edible films and coatings are thin layers of edible materials wrapped or coated on food products that play an important role in the protection to maintain quality of food products and their packaging. Edible packaging materials can be classified into three categories: polysaccharides, proteins and lipids. Films are made from the solutions of same components and dried to form material. In similar way edible coatings are made, but these are directly applied to the food product in a form of liquid and dried. Edible films and coatings are commonly used to improve mechanical properties of the food, limit the movement of moisture and the barrier effect against gases flow, provide antimicrobial capabilities to the product, enhance the sensory properties, enhance the optical properties and improve the shelf life of the product. In recent years Edible films and coatings have received considerable attention because of their use in Packaging Industries as an intelligent packaging. By functioning as barriers, edible films and coatings improve the recyclability of packaging materials, compared to other packaging materials. The objective of this review is to

provide an introduction to edible coatings and films by providing descriptions of suitable materials, methods of their applications and potential uses. Keywords: Edible film, coatings, polysaccharides, proteins, lipids and intelligent packaging.

FPT-P-03

TECHNOLOGICAL ADVANCEMENT OF GUAVA TOMATO: JELLY

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In recent years, the light has focused on foods rich in nutritional and functional properties. From this point of view, the consumer's trend has been toward foods with more natural, dietary fibers, natural colorants, minerals, vitamins, low calories, low cholesterol, and low fat and free of synthetic additives. The present investigation was made with an attempt to develop guava jelly by partial addition with different level of tomato juice. For control, jelly was standardized to 100% guava juice, 75% sugar, 3% citric acid, and treatment T₁ was standardized to 80% guava juice, 20% tomato juice, 75% sugar and 3% citric acid, T₂ was standardized to 70% guava juice, 30% tomato juice, 75% sugar and 3% citric acid & T₃ was standardized to 60% guava juice, 40% tomato juice, 75% sugar and 3% citric acid. The jelly samples of different treatments and control Physico-chemical analysis moisture percentage, TSS, acidity, protein, ascorbic acid, ash, and pH was done for estimating its nutritional content and safety and Organoleptic characteristics. The treatments containing 30% tomato juice score the highest value. Microbiological analysis was carried out to assess the shelf life of the best treatments T₂ checked through SPC, yeast and mould count, and presumptive coli form test. The results revealed less than 10/g (standard value) yeast and mould count and negative coli form test when compared with the FPO standards. Thus as for as product acceptability judged by Organoleptic evaluation and therapeutic value is concern, the treatment can be rated as T₂>T₀>T₁>T₃.

FPT-P-04

DEVELOPMENT OF VALUE ADDED READY TO EAT (RTE) HEALTHY SNACKS USING PEARL MILLET AND HQPM

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Pearl millet (*Pennisetum glaucum* L.) containing foods especially ready-to-eat (RTE) food products are not available in the market. The present study was carried out to utilize the pearl millet and HQPM for the preparation of value added healthy RTE snacks. Pearl millet flour from white grain variety (ICMV-221) was prepared after blanching and dry milling. HQPM-7 was also processed to prepare grits. RTE snacks are usually prepared from maize flour/starch. The process for preparation of RTE snacks with maize grits was standardized using twin screw extruder. For the preparation of value added RTE snacks 20, 40, 60, 80, and 100 % pearl millet flour was used along with HQPM-7 grits. The RTE snacks were evaluated for sensory and physical quality characteristics. With incorporation of pearl millet flour bulk density (BD) decreased, expansion ratio increased and however texture was acceptable. The RTE snacks containing 80 % pearl millet flour was found most acceptable in terms of sensory characteristics i.e., color, appearance, taste, texture and overall acceptability and adjudged 'liked very much' by the judges. These snacks contained high protein, fibre and low in fat. Results indicate that these varieties of pearl millet and HQPM can be processed to prepare flour and grits which can be utilized to prepare value added healthy RTE snacks.

Keywords: Pearl millet, blanching, dry milling, twin screw extruder, RTE snacks, physical characteristics, sensory characteristics.

TECHNICAL SESSION III

FOOD AND HEALTH CARE (FHC)

FHC-O-01

DIETARY SPIRULINA AS FUNCTIONAL FOOD FOR DIABETICS

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Diabetes mellitus represents one of the greatest threats to modern global health. Its incidence is rising rapidly and affecting human population with a significant impact on the health, their nutritional status, as well as on their life style system. Dietary interventions are a long term and sustainable approach in prevention and treatment of diabetics. Spirulina has a unique blend of nutrients that no single plant source can provide. Today it is used by many people who know its value as a nutrient powerhouse. It has a high concentration (60-70% of its dry weight) supplying 18 of the 22 known amino acids, including all the eight essential amino acids in balanced proportion. The aim of the present study was to examine the effect of spirulina as dietary supplement for diabetics. A well structured questionnaire was framed to know the information on personal profile, health, nutritional status and life style patterns of selected diabetics. A spirulina based food product has been developed for supplementation which is a part of nutrition intervention. The clinical trials are in progress. Spirulina, with its high concentration as functional food emerging an important and therapeutic food for diabetics and the research is in progress to find out the beneficial and therapeutic effects of spirulina as dietary supplementation for diabetics.

FHC-O-02

A REVIEW OF TRADITIONAL ANTICANCER NANO-MEDICINE: TRIPHALA

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Ayurveda, the science of life, prevention and longevity is the oldest and most holistic medical system available. In the last few years there has been an exponential growth in the field of herbal medicine and these drugs are gaining popularity both in developing and developed countries because of their natural origin and less side effects. Many traditional medicines in use are derived from medicinal plants, minerals and organic matter. The World Health Organization (WHO) has listed 21,000 plants, which are used for medicinal purposes around the world. It has

recently come to the attention of Western medical researchers seeking novel therapeutic compounds. The present study was performed to evaluate, the anti-cancer herbal drug (Trifala) preparations. The screening a number of traditional Vedic formulas scientists discovered that one of the most revered of all Ayurvedic combination – Triphala (Harad, Bahada & Amala) in different ratios exhibits a number of health benefits, including: Anti-cancerous, Antipyretic, Antiulcer, Antidiabetic etc. activities. Keywords: Triphala, Anti-cancer, Antiulcer, Anti-diabetic etc.

FHC-O-03

A STUDY OF A BAROATS BISCUITS

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A shelf life study was undertaken to standardize an innovative nutritious product for consumer acceptance. The product designed was a cereal based and protein based and a nutritionally rich common food product – Baroats biscuits made with two kinds of flours oats and barley, almonds, jaggery and refined coconut oil. The product provides good amounts of energy, protein, micronutrients and adequate fiber and has a good satiety value. Shelf life study included sensory evaluation by scoring method based on a five point scale. Evaluation was done on sensory attributes like color, taste; texture, aroma and mouth feel of the product. The other aspects covered in the study were packing, budget, Nutritional labeling and marketing. Keywords: Baroats biscuits, Oats, Barley, sensory evaluation.

FHC -O-04

PHYTOCHEMICAL INVESTIGATIONS OF VACCUM DREID EXTRACT OF *L. SICERARIA*

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Pure juice is extracted by juice extractor from Bottle gourd (*L. siceraria*) and dried through vacuum distillation to get dry mass, followed by freeze drying to get semisolid mass (BGJP) for the purpose of qualitative and quantitative phytochemical analysis. Whole Bottle gourd powder (WBG) and pulp powder (PP) remaining after juice extraction were also analyzed. Antioxidant activity was assessed by 1-1, diphenyl-2-picrylhydrazyl radical (DPPH) reducing capacity which showed I_{c50} value of 31.0 ± 0.2 mg/ml in Whole bottle gourd powder (WBG). The I_{c50} value for ascorbic acid was 27.83 ± 0.4 mg/ml. Total phenolic

content was assessed by Folin - ciocalteu method its result showed presence in all samples in which WBGP contains highest amount whereas *L. siceraria* pulp powder (PP) showed lowest presence of total phenolic content. Total flavonoid content was assessed by applying method given by Ordon ez *et. al.*, 2006 although method given by Kumaran and Karunakaran (2007), was employed for the analysis of total flavonols were showing the highest level of flavonoids (440mg/g) and flavonols (10.092mg/g) in WBGP, which is the indicator of presence of antioxidant compounds in Bottle gourd and its byproducts which are beneficial for health specially to combat metalolic stress.

FHC-O-05

ANALYSIS OF SELECTED MEDICINAL PLANT PARTS FOR NUTRITIONAL AND PHYTOCHEMICAL COMPOSITION

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Medicinal plants have been in major demand due to the great efficiency of herbal remedies. 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 anti-nutritional compositions. The results showed that the leaves contain high percentage of moisture (73.02 % & 76.04 %). The mineral contents in each herb samples were calcium (212, 318.62, 224, 218.24 mg/100 gm) and phosphorus (193, 250.13, 201.32, 151.45 mg/100 gm) respectively. The leaves were found to be richer in vitamin C, phosphorus, magnesium, calcium and manganese as compared to stem and root parts, while stem and root samples of *Tinospora cordifolia* and *Boerhaavia diffusa* were found to be rich in fibre content (14.831 % & 18.3 %) respectively. The herb analyzed were found rich in specific compound having medicinal properties i.e. berberine in *T. cordifolia*, andrographolides in *A. paniculata*. The *B. diffusa* leaves and roots showed 24.32 % and 18.23 % radical scavenging activity, respectively. The leaves were found to be richer in phytochemicals as compared to stem and root parts. The presence of vitamin and mineral compositions make them strongly suitable to be incorporated into human nutrition.

Keywords: *Boerhaavia diffusa*, *Andrographis paniculata*, proximate and chemical compositions.

FHC-O-06

A STUDY OF A MULTIGRAIN GLUTEN FREE AND PROTEIN RICH FLOUR – MEAL TO HEAL

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A study was conducted to understand the acceptance of blended healthy gluten free high protein flour; our aim was to standardize an innovative, preservative free, simple, nutritional blend that is cost effective. The product designed was multigrain flour, having a unique blend of chick pea, oats, soya, Indian chia- sabja and fenugreek. This makes the product gluten free, protein rich having high fiber content with good amounts of antioxidants. The acceptance was studied by conducting a sensory evaluation using the scoring method based on a five point scale. The Evaluation was performed on sensory attributes like appearance, color, taste, texture, aroma, and overall acceptability of the product. Microbial analysis was carried out for validation of its shelf life. Our other vital focus was on packaging, nutritional labeling, budgeting and marketing. Keywords: multi-grain flour, gluten free, sensory evaluation, neurological disease, obesity, celiac disease, healing, diabetes, functional foods, heart disease, high protein.

FHC-O-07

A STUDY OF GALACTOGOGUE: THE FLAX OF LIFE –HEALTHY SQUARE

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A shelf life study was undertaken to standardize an innovative nutritious product for consumer acceptance. The product designed was a galactogogue and a nutritionally rich food –healthy squares made with varied kind of ingredients like flax seeds, fenugreek seeds, milk, dill, cashew nuts, coconut, semolina, dry dates, jaggery and ghee. The product provides good amount of biological protein, and it also has a functional food property. It also contains vitamins and minerals which suppress free radicals. Fibres and fat has a good satiety value. Shelf life study included sensory evaluation by scoring method, based on a five point scale. Evaluation was done on sensory attributes like color, taste, texture, aroma, and overall acceptability of the product. Microbial analysis was carried out to see the shelf life. The other aspects covered in the study was packaging, budgeting, nutritional labeling and marketing. Key words: Healthy Square, galactogogue, innovative recipe, microbial testing, sensory evaluation.

FHC-O-08

JOWAR CHIVDA

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Jowar chivda is developed as a snack for a cardiovascular disease individual. It is based on a traditional Maharashtrian savoury item, "Pohyancha Chivda". The traditional recipe is modified in aspects to improve its fiber, fat and sodium content. Jowar is used as it is high in fiber which makes it beneficial for CVD. Other ingredients like flaxseeds, sesame seeds confer benefits on CVD. Jowar when compared with traditional poha is not only more adequate for CVD but also better nutritionally. After designing this product, sensory evaluation was conducted by 14 naive panel members and 4 expert panel members using 5 point ranking scale. The product was standardized. The product provides up to 14g of fiber and moreover low in sodium. Keywords: Jowar chivda, Pohyancha chivda, CVD

FHC-O-09

EFFECTS OF MULTIGRAIN CHIPS ON CARDIOVASCULAR DISEASE (CVD)

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Multigrain chips were made by modifying traditional Crispy Chips for Cardiovascular disease individuals. Traditional Chips were modified by adding Bajra, Jowar, Soyabean, Rice, Flaxseeds and Dried Fenugreek which are beneficial for CVD. It altered sodium, fiber and fat content of the traditional recipe. Soyabean helps to reduce hypercholesterolemic effects in CVD individuals. The product was baked rather frying. After designing this product; sensory evaluation was conducted by 14 naïve panel members and 4 expert panel members by using 5 pint ranking scale. The product initially scored 3/5 hence further modifications were done and the product scored 4/5. The product was standardized. The product provides upto 17 g of fiber and low in Sodium i.e. 22 mg.

Keywords: Multigrain chips, Crispy Chips, Low Sodium, Fiber, and CVD.

FHC-O-10

BAKED KACHORI

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Rajasthani cooking is influenced by both the war-like lifestyles of its inhabitants and the availability of ingredients in this arid region. Food that could last for several days and could be eaten without heating is preferred. Scarcity of water and fresh green vegetables has a major effect on the cooking. It is also known for its snacks like Bikaneri Bhujia, Mirchi Bada and Pyaaj Kachori etc. A kachori can be made with variety of fillings. Due to its popularity the kachori was modified especially for cardiovascular patients. The product was modified using soya granules, moong dal, jowar flour, wheat flour, methi leaves & olive oil to increase its nutritional composition; high biological value protein, low in sodium and potassium, low in fat, easy to digest and good in fiber content. Cooking method was altered as well; baking was done instead of frying. Sensory evaluation of this product was done on a 5 point scale and on the basis of the comments from panel members the product was modified each time. As CVD patients require good fiber, protein, omega 3 and low fat this product had all these nutrients. Rajasthani cuisine is very famous and the product was highly accepted.

Key words: Rajasthani cuisine, Traditional, Kachori, Modified, Cardiovascular patients.

FHC-O-11

DRY FRUIT CHUTNEY

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Chutney or pickle may be lunchtime staple for many but; overall chutney and pickle are failing to capture attention of many, so the focus is on making innovative and modified dry fruit chutney. This product can be preserved meaning its nutritious content remains intact and they are also low on saturated fats and high in unsaturated fats i.e. monounsaturated fatty acids and polyunsaturated fatty acids and served alongside with Indian meals. It is made especially for obesity and it can be consumed everyday without any hesitation of its high calorie intake. Hence it can be eaten with any kind of Indian bread, snacks, salads etc. To accompany this dry fruit chutney a 7 grain khakhra Indian roasted bread) is created which is apt combination for having along with breakfast and snacks. The long shelf life of this product is major benefit as consumers tend to eat such product little and often.

Keywords: modified healthy side dish, omega 3, omega 6, antioxidant, and low calorie.

FHC-O-12

MULTIGRAIN BAKED CHAKLI

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Chakli was developed as a savoury snack for obese people. Chakli is a maharashtrian delicacy that was developed from 'BHAJNI'. The traditional recipe of bhajni i.e fried chakli was modified in order to improve its fat and fibre content. Baked chakli possessed oats in it which was fibre rich that helped in losing weight and avoid other disorders like CVD, Diabetes Mellitus and other risk factors. It's other ingredients like chilli flakes, sesame seeds; curry leaves showed their benefits in obesity. When baked chakli was compared with traditional fried chakli or bhajni it was adequate for obesity and more nutritious also. After designing the product sensory evaluation was conducted by using a 5 point rating scale. The product was standardized. Keyword: Baked chakli, Bhajni, Obesity.

FHC-O-13

MULTI GRAIN CANAPÉ

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Multigrain Canapé is snack eaten in one bite for Diabetic individuals. It is basically made from Maida or white bread as the base. The recipe was modified in aspects to improve the fiber and fat content as fiber had shown to decrease the glucose level in the body. Multigrain was used along with spices and functional foods to enhance reduce glucose level. Functional foods such as Ginger powder, Ajwain, soaf and Haldi were used. A sensory evaluation was conducted after the product was designed and modified by 14 naive panel members and 4 expert panel members using 5 point scale. The product was then standardized. The review of literature was searched to prove the effect of foods incorporated in the modified recipe to show their effects on diabetic individuals.

Keywords: Maida Canapé, Multigrain Canapé and Diabetes.

FHC-O-14

A STUDY OF MULTIGRAIN GLUTEN FREE GROUNDNUT AND EDIBLE GUM BISCUITS

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A study was conducted to standardize an innovative nutritious product for consumer's acceptance. The product designed was a nutritious product for all age groups, gluten allergic people, pregnant and lactating mothers and under weight or malnourished children and people. The nutritionally rich common food product - multigrain gluten free biscuits, made with varied kind of flours (ragi, jowar, soybean, oats, maize), groundnuts, and functional food "dink". The product provides good amounts of proteins, functional property, vitamins (especially vitamin A) and minerals and adequate fiber. Shelf life study included sensory evaluation by scoring method based on a five point scale. Evaluation was done on sensory attributes like color, taste, texture, aroma, appearance, mouth feel and overall acceptability of the product. The other aspects covered in the study were packaging, budget management, nutritional labeling and marketing. The result showed that the product was widely accepted.

Keywords: multigrain gluten free biscuits, galactogogue, gluten allergic people, underweight, malnourished, proteins, vitamin A, β -gluten, sensory evaluation.

FHC-O-15

A STUDY OF DARK CHOCO PUFF CRACKER –A HIGH CALORIE SNACK

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A shelf life study was undertaken to standardize an innovative nutritious product for consumer acceptance. The product designed was a Dark choco-Puff Cracker – A High Calorie Snack, made with rice puffs, ground nut, oats, sesame seeds, raisins & functional food "dark chocolate". The product provides high calories, functional property and adequate fiber. Shelf life study included sensory evaluation by scoring method based on a five point scale. Evaluation was done on sensory attributes like color, taste, texture, aroma and overall acceptability of the product. The other aspects covered in the study were packing, budget, Nutritional labeling and marketing.

Keywords: Dark chocolate, high calorie snack, sensory evaluation.

FHC-O-16

ANTIOXIDANT ACTIVITY IN SOME SELECTED PLANTS OF HIMACHAL PRADESH

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The antioxidant activity was assessed in 10 plant leaves viz., *Quercus* spp. (Oak- Bun and Banj), *Ficus roxburghii* (Tremal), *Terminalia arjuna* (Arjuna), *Hippophae* spp. (Sea buckthorn), *Bauhinia variegata* (Kachnar), *Phoenix sylvestris* (Jungli Khajoor), *Celtis australis* (Khirk), *Albizia chinensis* (Oee), *Salix tetrasperma* (Buince; bitter) and *Terminalia chebula* (Harad leaves). Antioxidant activity was also determined in Harad fruit and *Terminalia bellerica* (Bhera fruit). Antioxidant activity of methanolic extracts was expressed as percentage of DPPH radicals inhibition and IC₅₀ values (µg/ml). IC₅₀ value for oak (Bun), oak (Banj), arjuna, sea buckthorn, kachnar, jungli khajoor, harad leaves, harad fruit and bhera fruit were observed to be 4.70, 6.72, 2.73, 4.21, 4.91, 13.40, 4.58, 2.94 and 3.22µg/ml, respectively. IC₅₀ value for standard ascorbic acid was found to be 2.08µg/ml. No antioxidant activity was detected for tremal, khirk, oee and salix leaves extracts at the concentration of 16.66µg/ml. The largest capacity to neutralize DPPH radicals was found in arjuna leaves followed by harad fruit and bhera fruit. It was concluded that some of these plants can be regarded as promising candidates for natural sources of antioxidants with high value.

FHC-O-17

BAKED SOY SEV

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Development of innovative product was carried out to develop a healthy product and check the storage stability of snack food prepared by using processed soy flour. The main objective to use soy flour was to develop comparatively low glycemic index food for diabetic patients. Soy flour having comparatively low glycemic index was been chosen for making the product. Early studies showed that starchy carbohydrate foods have very different effects on postprandial blood glucose and insulin responses in healthy and diabetic subjects, depending on the rate of digestion. Soya bean was soaked, dried and milled in order to reduce the effect of enzymes in raw soy flour affecting the pancreatic functioning causing pancreatic hypertrophy. Keeping health as the major concern innovation of the traditional sev recipe was undertaken. Innovation was brought about by replacing besan with soya flour and

essentially deep frying with baking. Keywords: soy flour, low glycemic index food, diabetes, innovation, baked.

FHC-O-18

NUTRITIOUS - QUICK MIX SNACK

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A nutrient rich healthy snack was designed with all health benefits for general crowd as well as diabetic and obese people. Healthy Crunchy Bhel was developed with oats, flax seeds, Ragi, garlic as functional food etc. The product provides good amount of fiber, calcium, proteins, omega 3 fatty acids and energy. Shelf life study was done for the product which included sensory evaluation by scoring test. Evaluation was done to know the characteristics of taste, appearance, texture, after effect etc. the other aspects covered in the study were Budgeting, packaging, Nutritional labeling etc. Keywords: Healthy snack, functional food, sensory evaluation, shelf life study, Nutritional label.

FHC-O-19

AN INSIGHT INTO THE NUTRITIONAL, PHYSICO-CHEMICAL AND SHELF LIFE STUDIES OF WHEY-GUAVA BEVERAGE

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Market demand for beverages is growing all over the world and India is no exception to it. Whey beverages have been recognized as a genuine thirst quencher, light, refreshing, healthful and nutritious. Whey based fruits beverages are more suitable for health as compared to other drinks. Whey and its biological components have proven its effects in treatments of cervical chronic diseases like cancer, cardiovascular, HIV etc. Whey is used as an additive in many processed foods, including breads, crackers, and commercial pastry, and in animal feed. Whey proteins consist primarily of α -lactalbumin and β -lactoglobulin. In the present study, experiments were conducted to develop beverage from paneer whey and guava pulp and development of a process for its economic utilization that would be of great benefit to the dairy industry. Whey was utilized along with guava pulp for the development of beverage. The ratio of whey and guava pulp that were utilized for the preparation of beverage was 67.5% Whey and 20 % guava pulp. Different treatments which include different temperature and time combination were given to it at 60°C, 65°C, and 70°C. Samples were evaluated initially and after that at an interval of 15, 30, 45, 60, 75, and 90 days for sensory analysis. The samples were analyzed for their chemical and microbiological analysis at

regular intervals. After chemical analysis it was found that it has high protein and minerals content, and a shelf life of approximately 75 days. But this can be increased by providing better techniques and conditions. Effect of different temperatures, timings and storage periods on the mean sensory sources of whey-guava beverage was significant and changes were observed in total sugars, reducing sugars, non reducing sugars and vitamin C during the storage period. However, whey guava beverages pasteurized at 65°C for 25 minutes was found to be best in terms of sensory quality after 45 days and pH, acidity, protein, total sugars and reducing sugars found to be high than that of the other samples. Keywords: Whey beverage, guava pulp, sugars.

FHC-O-20

DEVELOPMENT AND QUALITY EVALUATION OF PINEAPPLE POMACE FORTIFIED BISCUIT

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Bakery products have become more popular in India since the earlier times. Among the different bakery products, biscuits constitute the most popular group as they can be stored for a long time. Biscuits are chemically leavened bakery products containing high percentage of fat and sugar; they contain soft wheat flour, shortening, sugar, fat, eggs. These ingredients are considered to be low in nutritive and biological values since soft wheat flour used for the production of biscuits is deficient in several nutrients including some vitamins, mineral elements and contains only 7 to 10% protein. Hence the low nutritive value of biscuits is an issue of great concern because biscuits are the most commonly consumed by every age group. Present study was conducted to incorporate Pineapple pomace powder (*Ananas Cosomus*) in fortified biscuit and carry out its shelf life studies. Pineapple pomace powder was incorporated with wheat flour or (Maida) in different proportions (i.e. Sample 95:5, Sample 90:10, Sample 85:15 and Sample 80:20) Physico- chemical and sensory parameters of control and pineapple pomace fortified biscuit were analyzed after baking. During shelf life study it was observed that moisture content of control and treatment showed slight increase or decrease from zero to 15 days but after 30, 45 and 60 days there was a increase in moisture content of control. During sensory analysis and microbial analysis on all experimental samples, it was found that within 60 days of shelf life of all samples, little colonies were formed and were count spc, y/m and coliform during storage days of biscuit. (90:10 and 85:15) sample was found satisfactory to store for a period of upto 45 and 60 days. So, apart from that pineapple pomace can be recommended to the patients those are suffering from heart diseases and other constipation problem. Key words:

Waste utilization, Pineapple pomace, fibre rich fortified biscuit; low fat content, calorie poor.

FHC-O-21

NANOTECHNOLOGY IN NUTRITIONAL SUPPLEMENTS

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Recently, investigators in the food and nutrition sciences have been applying the tools of nanotechnology in their research. The last decade has witnessed the development and arrival of novel nano-based food materials, innovative food packaging, intelligent delivery mechanisms of nutrients and bioactive materials, implementation of green nanotechnologies for crop production and nano-biosensors to provide safer foods and waste reduction. Nanotechnology has emerged as a promising method of delivering bioactive materials to humans through skin care products, pharmaceuticals, packaging, foods, and dietary supplements. Some players in the dietary supplements and personal care products industries view nanotechnology as a major breakthrough and would like to use it as a way of increasing the benefits of nutraceuticals and cosmetic products. However, others are concerned about the fate of nanoscale particles in our bodies and in our environment. Key words: Nanotechnology, nutrition, supplements, bioactive materials.

FHC-O-22

LIPID BASED MOLECULES AS FUNCTIONAL FOODS

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It is a general association in our brains that lipid consumption is harmful for human health, but there is increasing evidence that diets containing higher level of certain lipid components are related to reduce risk of numerous diseases. Large variety of lipid based molecules like triacylglycerols, fatty acids, antioxidants, sterols & stanols, squalene and other minor components exhibit positive effect on human health. The precise nature of these minor components varies greatly among edible oils and both horticultural practices & processing can greatly affect the content of these in oils. Triacylglycerol types in oil are directly related to fat absorption, plasma lipid concentration and many other things; consumption of unsaturated fatty acids reduces the risk of heart diseases; antioxidants prevent oxidation of polyunsaturates to prevent risk of atherosclerotic lesions (by protecting LDL cholesterol from oxidation);

phytosterols are known to inhibit cholesterol adsorption in the body and squalene is a precursor of sterols as well as there is evidence that it reduces the risk of colon & skin cancer. Besides these there are several other minor components which have a positive health effect. More research is needed on the precised health benefits from these compounds and processing methodologies need to be modified so that there is minimum damage (or loss) to these components.

Keywords: Lipids, functional foods, triacylglycerols, fatty acids, antioxidants, phytosterols and squalene.

FHC-P-01

BIOACTIVE COMPOUNDS: INFLUENCE TOWARDS HUMAN HEALTH

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Bioactive compounds are extra nutritional constituents that have much beneficial effect proving protection and improvement of human health. In the study it was found that natural food are known for the presence of many bioactive compounds such as plant pigments and fiber present. Consumption of polyphenols, carotenoids and fibers offer health benefits which proofs protection against many diseases as cardiovascular diseases, cancer and many degenerative diseases. This finally shows that globally consumers are opting for numerous natural neutraceuticals as they believe the bioavailability and the risk of side effect is much lower. Extensive scientific research is needed to make science based dietary recommendation. Despite this there is evidence for consumption of diet rich bioactive compounds present in fruits, vegetables, grains, oils and nuts.

FHC-P-02

POTENTIAL OF BIOACTIVE PEPTIDES AS NUTRACEUTICALS: AN OVERVIEW

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Health and disease of individuals and of populations are the result of three groups of factors: genetics, environment and behaviour. The term 'Lifestyle' can be

defined as: 'the way individuals, family circles, and societies live and the behaviour they manifest in coping with their physical, psychological, social and economic environments on a day-to-day basis'. 'Lifestyle diseases' share risk factors similar to prolonged exposure to three main modifiable lifestyle behaviours – smoking, unhealthy diet (including alcoholics abuse), and physical inactivity. These results in the development of non-communicable, chronic and substantially degenerative 'lifestyle' related diseases that can actually be considered as the consequences of "contagious" behaviours. Dietary changes and life-style modifications are essential to plan preventive strategies and promote the health of these populations. Dietary proteins have long been recognized for their nutritional and functional properties. Apart from their nutritive value, they are instrumental in the regulation of food intake, glucose and lipid metabolism, blood pressure, bone metabolism and immune function. Currently, bioactive peptides from fishes and vegetable proteins are gaining importance for their hypotensive and anti-inflammatory properties. Present discussion thus aims to elucidate the role of food derived bioactive peptides and their applications as ingredients in the areas of nutrition, food industry and health care.

FHC-P-03

OAT FLOUR INCORPORATED BREADS AS FUNCTIONAL FOOD FOR COMBATING DEGENERATIVE DISEASES

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The beneficial effect of healthy diet on quality of life and on the cost-effectiveness of health care has promoted food industry to face challenges of developing new food products with special health promoting characteristics. This involves the identification of new sources of neutraceuticals, as well as other nutritional and natural materials with desirable functional characteristics like oats. Besides having high amounts of valuable nutrients, oat contains high amount of dietary fibers especially soluble dietary fibers, which can help in controlling hypertension as well as in reducing blood lipid, glucose and cholesterol levels when used with other appropriate public health measures. In present study high fiber and nutritious oat breads were developed by incorporating different proportions of oat flour and their physical and sensory characteristics were evaluated for acceptability of the product. Ten per cent oat flour incorporated bread was found to be most acceptable by the evaluators. The loaf volume of oat breads decreased with the increased incorporation of oat flour, while weight of the breads increased with increased oat flour incorporation. Evaluation of nutritive value of oat bread showed comparatively higher content of fiber, protein, iron. Hence, suitable for combating various degenerative diseases.

FHC-P-04

A REVIEW ON IMPORTANCE OF NATURAL SWEETENER, A ZERO CALORIE PLANT – STEVIA - HAVING MEDICINAL AND COMMERCIAL IMPORTANCE

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Sugar is an inseparable part of the food we consume. Artificial sweetener (A sugar substitute) is a food additive that duplicates the effect of sugar in taste, but usually has less food energy. Besides its benefits, animal studies have convincingly proven that artificial sweeteners cause weight gain, brain tumors, bladder cancer and many other health hazards. Stevia is a natural sweetener plant and estimated to 300 times sweeter than sugar cane. Stevioside is regenerated as a valuable natural sweetening agent because of its relatively good taste and chemical stability. Products can be added to tea and coffee, cooked or baked goods, processed foods and beverages, fruit juices, tobacco products, pastries, chewing gum and sherbets. The direct effect of stevioside on transport activity of glucose in skeletal muscle study divulged that insulin action on muscle glucose transport might be improved due to the low concentration of stevioside, signifying that stevioside has the imminent action in the glucose transport system in skeletal muscle. Also, it has a potential commercial value and that is why private and public biotechnology companies are producing stevia in huge quantity and marketing its products. Stevia is such a versatile herb with sweetness that possesses anti-fungal and anti-bacterial property also. It can be safely used in herbal medicines, tonics, for diabetics and also in the daily usage products like mouth washes, and tooth pastes. Leaves of this plant produce zero-calorie, a non nutritive, high potency sweetener and substitute to sucrose.

FHC-P-05

A REVIEW ON POTENTIAL BENEFITS OF FLAX IN FIGHTING HEART-DISEASE

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Flaxseed has recently gained attention in the area of cardiovascular disease primarily because it is the richest known source of α -linolenic acid (ALA) and phytoestrogen, lignans, as well as being a good source of soluble fiber. Human studies have shown that flaxseed can modestly reduce serum total and low-density lipoprotein cholesterol concentrations, reduce postprandial glucose absorption, decrease some markers of inflammation, and raise serum levels of the omega-3 fatty acids, ALA and eicosapentaenoic acid. We studied the effects of flaxseed on

markers of cardiovascular risk in hypercholesterolemic adults. Flaxseed oil does not affect serum lipids, except for a slight reduction in serum triglycerides. Lignan in general reduces serum total cholesterol. Flaxseed oil suppress oxygen radical production by white blood cells, prolongs bleeding time, and in higher doses suppress serum levels of inflammatory mediators and does not lower serum lipids. Dietary flaxseed supplementation lowered total cholesterol and low-density lipoprotein cholesterol (LDL-C) by approximately 7% and 10%, respectively. However, the levels of high-density lipoprotein (HDL) and triglyceride remained unaltered. Dietary flaxseed may also protect against ischemic heart disease by improving vascular relaxation responses and by inhibiting the incidence of ventricular fibrillation.

FHC-P-06

NUTRI TACOS

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Mexican cuisine is primarily a fusion of indigenous Mesoamerican cooking. A taco is a traditional Mexican dish composed of a corn tortilla folded or rolled around a filling. A taco can be made with a variety of fillings. Due its popularity among population this product was modified especially for CVD patients. Product was modified using jowar and broken wheat flour and cornflakes powder to increase its nutritional composition; high in dietary fibre, low sodium, low fat and energy compare to Traditional Recipe. Cooking method was altered to baking instead of deep frying. Sensory evaluation was done by using 5 scale scoring method by trained panel members. As per the comments from panel member product was modified each time. As the CVD patient requires good amount of dietary fibre this product was rated high in fibre. Mexican cuisine is worldwide famous among population due to that Nutri Tacos was highly accepted. Key Words: Tacos, CVD, Mexican cuisine.

FHC-P-07

ANTI-NUTRITIONAL ANALYSIS OF PROCESSED BRAN

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Bran, also known as miller's bran, is the hard outer layers of cereal grain. It consists of the combined aleurone and pericarp. Bran is present in and may be milled from any cereal grain, including rice, corn (maize), wheat, oats, barley and millet. The bran is used for the enrichment of some foods, due to its high dietary fiber

content. Because of the numerous health benefits of dietary fiber, the consumption of bran from various cereal grains is increasing. The bran is used for the enrichment of some foods, due to its high dietary fiber content. Anti-nutritional factors lower the nutritional value of a food by lowering the digestibility or bioavailability of nutrients. Many foods particularly those of plant origin contain a wide range of anti-nutritional factors which interfere with the assimilation of nutrients contained in them. Hence the present study is undertaken to analyze the anti-nutritional properties such as peroxidase activity, trypsin inhibitor activity and phytic acid among the four variables such as barnyard millet bran raw, treated with distilled water, treated with acetic acid and treated with calcium hydroxide respectively. Results revealed that the barnyard millet bran treated with calcium hydroxide have the minimum anti-nutritional property followed by barnyard millet bran treated with distilled water and acetic acid. Hence it is concluded that the barnyard millet bran treated with calcium hydroxide have the low anti-nutritional factor which is selected as the best for the development of product.

FHC-P-08

DATES AND FLAXSEEDS BARFI

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Dates and flaxseeds Barfi is an innovative Indian sweet for a cardiovascular disease individual. It is based on a traditional north Indian sweet item "Besan Barfi". This traditional recipe was modified to reduce the fat and sugar content of the product. This product contains no dietary fat and sugar. Dates were used as the main ingredient as it is rich in dietary fiber, which prevents LDL cholesterol absorption in the gut and makes it beneficial for cardiovascular diseases. Other ingredients like flaxseeds, sesame seeds, almonds have beneficial role in CVD. After designing this product, sensory evaluation was conducted by 14 naive panel members and 4 expert panel members using 5 point ranking scale. The product initially scored 3/5 hence further modifications were done and the product scored 5/5. The modified product provides up to 15.6g of fiber and more over low sodium. Keywords: Dates, flaxseeds, barfi, CVD.

FHC-P-09

DEVELOPMENT OF CAKE BY USING SOYA WASTE

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Maintenance of optimal nutrition and positive health of Population through assumed nutrient intake continues to be a national priority. For a nation to be healthy, strong and productive, the nutritional status of people must be good. Soymilk and tofu production yields large quantities of agro waste (Okara). Okara is high in fiber making it a potential nutritious food ingredient. The shelf life of only a day makes it difficult to work with in large scale operations. In the new millennium we are witnessing the upward trend in nutritional and health awareness which has increased the consumer demand for functional foods. Keeping this in view industry is forced to bring nutritionally products in the market with acceptable sensory Characteristics. The present investigation was made with an attempt to develop a cake by using wheat and soya waste Okara. Control soya waste cake was incorporated with T₀ without okara (100% wheat flour), T₁ Was incorporated with 25% Okara flour, T₂ was incorporated with 50% Okara flour. T₃ was incorporated with 75% Okara flour. The soya waste cake samples of different treatments and control Chemical analysis fat percentage, protein, moisture, ash, and carbohydrate was done for estimating its Nutritional Content and safety and organoleptic characteristics like (flavour and taste, body and texture, colour and appearance) by trained panelist using 9 point hedonic scale. Thus as for as product acceptability judged by Organoleptic evaluation. These studies demonstrate that okara can be used to increase the value of the agro waste.

TECHNICAL SESSION IV

FOOD ENGINEERING AND BIOTECHNOLOGY (FEB)

FEB-O-01

BIOCHEMICAL STUDIES ON THE EFFECT OF MELATONIN ON SOME BIOMARKERS OF OXIDATIVE STRESS: SIGNIFICANCE TO HUMAN HEALTH

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Melatonin, which principally stabilises biological rhythm, is now known for its involvement in neuroprotection, tumorsuppression, and immunomodulation. Melatonin occurs naturally in humans as a pineal secretion and its basic function is the stabilisation of biological rhythms. The indoleamine is also a potent antioxidant and free radical scavenger showing its significance to human health with relevance to stress-induced physiological disorders. Melatonin maintains the optimal fluidity of cellular membranes by reducing the peroxidation of inherent polyunsaturated fatty acids and indirectly reducing increased membrane rigidity. Red blood cells contain several enzymes and ion-transport systems which act as biomarkers of oxidative imbalance. We observe that exogenous melatonin alters the activity of several biomarkers of oxidative stress in eukaryotic cells in a dose-dependent manner. Some of the cellular functions may be explained partly on the basis of melatonin's antioxidative function owing to the presence of indole ring, and partly on its effect on the fluidity of plasma membrane of red blood cells. We hypothesize that melatonin causes a day-and-night variation in several enzymatic activity in intact red blood cells and propose its therapeutic implications for further study.

FEB-O-02

USE OF PROBIOTICS AS DIETARY ADJUNCTS

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Four bifidobacterial species were isolated and identified from the faeces of breast fed infants by molecular techniques. Molecular tools like 16S rDNA targeted genus and species specific mPCR primers were used for confirmation. A total of 4 isolates were identified namely *B. longum*(IB₁₀ and IB₁₂) *B. breve* (IB₃₉)and *B.bifidum* (IB₄₂). Subsequently the nucleotide sequences of the identified

species were submitted to the GenBank for acquisition of accession number. The identified species were screened for probiotic properties like bile tolerance, antimicrobial activity and tolerance to acidity. All the four isolates showed more than 80 per cent viability in the presence of 0.4, 0.8 and 1 per cent of bile salt. Isolate *B.longum* (IB₁₀) showed maximum antimicrobial activity against *Bacillus cereus* ($zi3.03 \pm 0.019$ mm), *Staphylococcus aureus* ($zi3.00 \pm 0.031$ mm), *Escherichia coli* ($zi2.98 \pm 0.043$ mm) and *Pseudomonas aeruginosa* ($zi3.03 \pm 0.051$ mm) in the cell free supernatant. All the four bifidobacterial isolates showed more than 80 per cent viability at pH 3. *B.longum* (IB₁₀) was the ideal probiotic when compared to other isolates as it had maximum antimicrobial activity and tolerance to bile and acidity. Isolate *B.longum* (IB₁₀) was incorporated in the preparation of whey based malted nutraceutical spray dried food .The influence of feeding five grams of the spray dried nutraceutical malt food containing *B.longum* at 5×10^7 cfu/g per day on animal production , gut health and gut architecture in young weaned piglets was also investigated. The probiotic regime had positive effects on the health of piglets when compared to the control group. A highly significant difference ($P<0.01$) was noticed in the reduction of faecal coliform counts between control and experimental group from 28th day till 70th day. There was a significant two log reduction in the coliform count in *Bifidobacterial* fed piglets than the controls. Haematological studies like RBC count and haemoglobin levels showed a significant difference ($P\leq 0.05$) between the piglets fed with BMW and piglets maintained on control basal diet from the 45th day and 60th day respectively. Interestingly, there was a significant reduction in the serum cholesterol and triglycerides in experimental group when compared to control animals from the 30th day of feeding the nutraceutical powder. Thus these probiotic bifidobacteria can be considered as safe adjuncts for preparation of fermented dairy foods.

FEB-O-03

EFFECT OF PRESSURE, TEMPERATURE AND FLOW RATE ON SUPERCRITICAL CARBON DIOXIDE EXTRACTION OF BOTTLE GOURD SEED OIL

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Supercritical carbon dioxide extraction is an important technique to extract medicinal ingredient from the biological source. The bottle gourd seed oil has several uses in pharmaceuticals such as skin therapy in the treatment of benign prostatic hyperplasia and in the cosmetic products such as beauty creams and soaps. The investigation was carried out to extract the functional oil which having very high medicinal value from bottle gourd seed using

supercritical carbon dioxide. The results showed that the pressure and temperature had significant effect on the yield of bottle gourd seed oil. However, supercritical CO₂ flow rate had no significant effect on the extraction yield but still high flow rate was essential to ensure optimum mass transfer rate. A 250 µm sized sample gave highest oil yield of about 34.60 per cent at 50 MPa pressure, 333.15 K temperature and flow rate of 15 g/m for 3 hours of extraction.

Key words: Supercritical carbon dioxide; bottle gourd seed; functional oil; pressure; temperature.

FEB-O-04

EXTRACTION OF ESSENTIAL OIL FROM CORIANDER SEED

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Coriander (*Coriandrium sativum*) is an annual herb having family Apiaceae. It is main source of essential oil particularly petroselinic acid (68.8%) and linoleic acid (16.6 %). An essential oil from the seed is used as food flavouring, in perfumery and soap making, etc. semi-continuous supercritical carbon dioxide extraction unit was used to extract the essential oil from the coriander seeds. Dried seeds were subjected to extraction after grinding to particle size of 300µm. The extraction was carried out at three different pressure levels (30, 35 and 40 MPa), three temperature levels (308, 313, 318 K) and three levels of supercritical CO₂ flow rates (10, 15, 20 g/min). The highest essential oil was obtained at 40MPa, 313 K and 15 g/min combination of parameters and the highest yield was equal to 3.20 gm/100gm. The study showed that the temperature has more significant effect than the pressure while the flow rate was having no significant effect on the yield of coriander seed oil. The study provides an opportunity to pharmaceutical/cosmetic industries to obtain the highly pure oil using the optimized conditions. Keywords: coriander seed; supercritical carbon dioxide; temperature; essential oil

FEB-O-05

EFFECTS OF CHITOSAN COMPOSITE COATINGS ON GRAPES

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The effect of application of Chitosan composite edible coating on weight loss, firmness and Sensory evaluation was investigated for grapes fruits. Grapes was coated with Chitosan –whey protein blend and stored at 10

and 25°C for up to 16 days. Chitosan-whey protein blend significantly reduced weight loss of the fruits at both storage temperatures. The firmness of the control fruits significantly ($p \leq 0.05$) decreased with the storage time at both 10 and 25°C. The application of Chitosan composite edible coating delayed softening of grapes fruit during 16 days of storage at 10 and 25°C. Sensory characteristics of grapes such as color, taste, tenderness, appearance and overall acceptability of coated (5-20%) grapes were much better preserved while storing at 10 and 25°C for 16 days.

FEB-O-06

MICROBIOLOGICAL RISK ASSESSMENT OF DIFFERENT PANEER SAMPLES

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In tropical countries like India, dairy products are responsible for many outbreaks of gastrointestinal infections. Dairy products prepared under unhygienic conditions pose a great threat to the health of consumers. The Indian cheese (paneer) is a regular dietary favourite among the North Indians. Paneer has a short life span of about 5-7 days at refrigeration storage without much deterioration in the quality but freshness of the product is lost after 3 days. So, the present study was carried out to identify bacterial pathogens/contaminants in *paneer* samples of differently packaged and non-packaged paneer samples at Mother dairy foods processing ltd. Pataparganj, New Delhi. Six samples out of which four branded well packaged samples and two non-packaged local samples were comparatively assessed for microbiological risk assessment: Presumptive Coliform test, Standard Plate Count, Coliform test, yeast and Mould count. Adding salt in appropriate percentage acts a preservative agent and ultimately helps in increasing the shelf life of the product. Packaging in high intensity poly styrene (HIPS) grade trays also protects the product from the attack of microbes. Although the present scenario suggests that India is the second largest producer of milk in the world but still surplus amount of improvisations like better packaging, more hygienic environment during its production, good manufacturing techniques etc. have been made to bring out utmost quality product in Indian market.

FEB-O-07

ANTIOXIDANT AND ANTIBACTERIAL ACTIVITY OF ASAFOETIDA AND CAROM SEEDS

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Spices have been shown to possess medicinal value, in particular, antimicrobial activity, used in household medicines as well as preservatives of food materials. The present study was conducted on antibacterial activity of commonly used spices such as asafoetida and carom seeds. This study compares the sensitivity of some human pathogenic bacteria to various spice extracts such as 50%, 70% and 95% ethanolic extract by using disc diffusion method and well method. Antibacterial activity of asafoetida using 50% ethanolic concentration inhibits maximum growth of *S. aureus* followed by *Shigella*, *Salmonella* and *E.coli* whereas 70% inhibits the maximum growth of *Shigella*. 95% ethanolic concentration inhibits the maximum growth of *S.aureus* and *Shigella*. Antibacterial activity of carom seeds using 50% ethanolic concentration inhibits maximum growth of *S.aureus* followed by *Shigella*, *Salmonella* and *E.coli* whereas 70% inhibits the maximum growth of *shigella* followed by *E.coli*, *Salmonella* and *S.aureus*. 95% concentration showed inhibition against *Shigella* followed by *Salmonella*, *E.coli* and *S.aureus*. The result of present study shows that selected spices might have a great potential to be used as antimicrobial agents. Keywords: Spices, Antioxidant activity, Antibacterial activity.

FEB-O-08

BIOTECHNOLOGICAL TOOLS IN AGRICULTURAL AND FOOD SCIENCE RESEARCH

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Biotechnology has emerged as backbone of agricultural green revolution in modern era. Biotechnology is considered as a novel science but it is an age old phenomenon and its applications have contributed a lot in the development of human civilizations. The older popular versions of biotechnological processes include wine production, curd formation, antibiotic production like penicillin etc. leading to their industrialization. The introduction of molecular biology has lead to the better understanding of genetic processes in the living cells. The development of recombinant DNA technology resulted in the start of the new phase termed as modern biotechnology.

Gene isolation, gene sequencing, gene cloning, gene introgression, gene pyramiding, gene amplification are the major biotechnological tools considered as landmarks in genetic research or engineering, leading to the progression of biotechnology towards genomics, proteomics and bioinformatics. The agricultural aspects of biotechnology include development of disease resistant, abiotic stress resistant, nutritionally better and improved quality hybrid varieties of plants. Though the significances of biotechnology are not limited to agriculture, but are equally important in the fields of other sciences. This article is an attempt to overview the applications of biotechnological tools in the present scenario of agriculture and food science research with an aim of contributing to the global prosperity. Keywords: Agriculture, Food Science, Biotechnological tools, Crop Improvement, Food Production

FEB-O-09

COMPARISON OF YEAST AND MOLD CULTURES FOR THE PRODUCTION OF BIOPIGMENTS

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The color of the food products is an important criterion for consumer acceptance and marketability. Since certain artificial/synthetic color additives are associated with negative health effects upon their consumption, so the natural ingredients and additives in food products have attracted the keen attention of researchers. Natural biopigments are preferred colorants for food applications and are an exciting area of research. Natural pigments are also responsible for the inherent yellow, orange and red color of many foods. There is growing interest in pigments derived from microbes due to their natural character, medicinal properties, and nutritive value. Moreover the fermentative production is independent of season and geographical conditions, controllable and predictable yield. The microbial pigments can be produced from different bacterial, yeast and mold sources. Among these, *Monascus*, *Rhodotorula*, *Yarrowia*, *Achromobacter* sp. are some of the common pigment producing microorganisms. In the present investigation, the experimentation was carried out on the pigment production from yeast *Rhodotorula* and *Monascus* strains. The comparison of the results indicated that that *Monascus* sp. resulted in higher biopigment production as compared to *Rhodotorula* sp. Moreover, medium composition and cultural conditions also play an important role in the production and type/color biopigments.

FEB-O-10

SCREENING OF LACTOBACILLUS STRAINS FOR LACTIC ACID PRODUCTION USING POTATO WASTE LIQUID

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The utilization of food industry waste by recycling and reprocessing offers potential of returning these by-products into value added products, rather than their discharge to the environment, which might cause harmful environmental effects. In potato processing plants, a substantial amount of starch has been released in wastewater streams, which could be utilized cheaply as substrate for microorganisms producing high value added products like lactic acid. During present investigation, different bacterial strains have been screened for their amylolytic activity. The strains are further used for the production of lactic acid using potato waste liquid. The different media components have also been screened for the production of lactic acid. The quantification of lactic acid concentration has been carried out by high performance liquid chromatography. The maximum production of lactic acid was observed with potato waste liquid supplemented with calcium carbonate, yeast extract and manganese sulphate using *Lactobacillus casei* MTCC 1423.

FEB-O-11

COMPARATIVE STUDY ON CELL DISRUPTION TECHNIQUES FOR EXTRACTION OF β -GALACTOSIDASE FROM YEAST CELLS

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The enzyme β -galactosidase (EC. 3.2.1.23) has been used for the biotransformation of lactose into lactulose and galacto-oligosaccharides by the transgalactosylation reaction as well as into glucose and galactose by hydrolysis reaction, thus having a wide range of applications in dairy industry. But the industrial application of β -galactosidase is interrupted due to intracellular presence of the enzyme in the yeast cells. In the present investigation, different cell disruption techniques have been compared for the extraction of intracellular β -galactosidase from yeast cells and the enzyme activity has also been determined. The extraction methods include both chemical and physical treatments. Chemical treatments include permeabilization of the cell membrane by treating the cells with SDS-Chloroform, iso-

amyl alcohol and toluene. Physical disruption was carried out by sonication, homogenizing the cells in a bead mill, vortexing with glass beads, grinding with river sand as well as by freeze thawing. Among the different methods of cell disruption, the cells treated with SDS-chloroform displayed the highest enzyme activity of about 1.75 IU/mg DW followed by toluene treated cells which had an enzyme activity of 1.72 IU/mg DW.

FEB-O-12

EFFECT OF MALTODEXTRIN CONCENTRATION AND INLET TEMPERATURE DURING SPRAY DRYING ON PHYSICOCHEMICAL AND ANTIOXIDANT PROPERTIES OF AMLA (*EMBLICA OFFICINALIS*) JUICE POWDER

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The effects of inlet temperatures of 125, 150, 175 and 200°C and maltodextrin levels at 3, 5, 7 and 9 % on the physicochemical properties, total phenolic content (TPC) and 2, 2 diphenyl picryl hydrazide (DPPH) scavenging activity of spray dried amla juice powder were studied. Moisture content and hygroscopicity of powder were significantly affected by inlet temperature and maltodextrin level. However, an increase in the level of maltodextrin did not significantly affect the bulk density and water solubility index (WSI). An increase in drying temperature and maltodextrin concentration decreased the free radical scavenging activity of the powder. Morphological study revealed that at higher inlet temperatures the spray dried powder had small sized particles that were densely packed. Spray dried amla juice powder made with 7% maltodextrin and processed at 175°C inlet temperature had less hygroscopicity, acceptable color and potent free radical scavenging activity.

FEB-O-13

EFFECT OF ROASTING AND MICROWAVE COOKING ON ANTIOXIDANT ACTIVITY OF SELECTED CEREALS

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Investigations were carried out on the natural antioxidants in edible flours of barnyard millet, kodo millet, finger millet and red rice. The objective of the present investigation was to study the effect of traditional roasting and microwave cooking on antioxidant properties of different underutilized cereal grown in India. The selected cereals

were roasted in hot air oven and cooked in a microwave oven and evaluated for antioxidant activity (AOA), total phenolic content (TPC), total flavonoid content (TFC), reducing power and FRAP activity. Microwave cooking resulted in higher puffing index. Greater increase in yellowness of the roasted flour was brought about by microwave cooking. 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: antioxidant activity, microwave cooking, barnyard millet, finger millet, kodo millet, red rice, roasting,

FEB-O-14

ANTIOXIDANT ACTIVITY AND PHENOLIC CONTENT OF SELECTED TROPICAL FRUITS

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Antioxidant activity (TEAC) and phenolic contents of methanolic extracts of watermelon (*Citrullus lantus*), Bael (*Aegel marmelos*), Sapota (*Manilkara zapota*) were investigated. The total antioxidant capacity was estimated by the following methods: ABTS (2,20 azinobis-(3-ethylbenziazoline-6-sulfonic acid)), DPPH (1,1-diphenyl-2-picrylhydrazyl radical), ascorbic acid and ferric reducing/antioxidant power (FRAP). The total phenolics were measured using a Folin-Ciocalteu assay. The ascorbic acid, TPC, ferric reducing activity, FRAP, DPPH and ABTS of the fruits ranged from 5.59-11.44 mg/100 gm, 1.25-1.38mg gallic acid equivalent/ml, 0.130- 0.747mg/ ml, 1.505-4.98 mg/ml, 52.65-75.90% and 4.62-11.87 µmol/100gm. Highest antioxidant activity was highest for Bael fruit while least was observed for watermelon. Multiple regression analysis showed that the relationship of DPPH, FRAP, ABTS, reducing power with total polyphenols was highly significant.

Keywords: Antioxidant activity, phenolic contents, ABTS, FRAP, DPPH.

FEB-O-15

HYPOCHOLESTEROLEMIC AND ANTAGONISTIC ACTIVITY OF INDIGENOUS *LACTOBACILLUS* SPECIES ISOLATED FROM CAMEL MILK

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World Health Organization (WHO) has estimated that approximately 23.6 million people will be affected by cardiovascular diseases (CVD) worldwide by 2030. The

hypercholesterolemia is major causative factor for CVD including chronic heart disease. It has been seen that the reduction of cholesterol by 1 % in blood serum could reduce the risk of coronary heart disease by 2-3%. Although, drug-based therapy (3-hydroxy-3-methylglutarylcoenzyme A reductase inhibitors or drugs) is currently being used to treat this condition, it is often suboptimal, expensive and suffers from unwanted side effects. Another natural cost-effective and safe alternative approach which has recently been explored to manage cholesterol related problems is based on probiotic intervention. Lactic acid bacteria (LAB) exhibit various health-promoting properties viz., alleviation of lactose intolerance, cholesterol reduction, immunomodulation etc. The lactobacilli isolated from camel milk *Lactobacillus plantarum* 33, *Lactobacillus plantarum* 48, *Lactobacillus acidophilus* 15 has shown cholesterol reduction up to 76.89, 77.90, 78.06% in MRS broth. These cultures have shown conversion of cholesterol to coprostanol by cholesterol reductase enzyme and detected by TLC method. These isolates have shown strong antagonistic activity against gastrointestinal pathogens (*E.coli* 0157:H7, *S. aureus*, *S. typhi*, *Pseudomonas aeruginosa*, *E.coli*, *Listeria monocytogens*). The antibacterial activity of lactic acid bacteria is due to the production of antimicrobial agents such as organic acids, hydrogen peroxide and bacteriocin or related substances. Thus these cultures could benefit the host by reducing blood serum cholesterol levels and inhibition of gastrointestinal pathogens might also find potential application for the development of dairy functional foods.

FEB-O-16

NATURAL ANTIMICROBIALS COMBINED PROCESSES TO PURSUE SAFER AND HEALTHIER FOODS

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Food borne illness is still the issue of serious concern around the world including industrialized and developing countries. Thermal treatments, use of antagonistic additives and recently explored modern processing techniques have been adopted by industry to produce safer foods. However, in the prevailing scenario of food chain operations they are not specific in antimicrobial action; the effective intensity might leave serious damage on nutritional qualities and sensory properties of food items. Chemical preservatives although have greatly contributed in management of food safety and losses are lately being used in discriminately and negative influence on health has been identified. Besides this food industry is facing challenge from consumer driven market showing changing tendency towards health friendly foods. For these reasons antimicrobials of natural origin perceived much research attention as potential substitute for synthetic preservatives.

There are several investigations that demonstrate the inhibitory effect of natural antimicrobials derived from plants against several food borne pathogens. This study evaluated the use of physical treatments or bacteriocins or occurrence of activities with phyto preservatives especially for dairy foods. Fractional Inhibitory Concentration (FIC) index and kill-time assay were applied to determine the effect of the combined applications on susceptibility of food borne pathogens. *Listeria monocytogenes*, *E. coli* O157:H7 and *Saccharomyces cerevisiae* have shown enhanced sensitivity to the processes when combined than alone. The findings of this paper provide immense important approaches to reduce the processing intensities considering the demand for minimally processed foods without compromising safety and shelf stability of foods.

FEB-O-17

ANTHOCYANINS EXTRACTION FROM PLUM WASTE USING XAD-16 AND THEIR STABILITY AGAINST HEAT

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Anthocyanins as biocolour were extracted from plum pomace by passing the pomace-water mixtures (1:1) through XAD-16 in a column, followed by desorption with ethanol. Optimum concentrations of XAD-16 for adsorption, adsorption time of anthocyanins and desorbent (ethanol) concentration were standardized. The highest adsorption (61.70 per cent) of anthocyanin took place with 40 per cent XAD-16 which was almost comparable with 35 per cent XAD-16 (61.50 per cent). The lowest 'a' value (12.52) of the extract was observed at 8 hours showing the highest desorption of anthocyanins. The maximum desorption (94.96 per cent) took place with 60 per cent ethanol while it was minimum (36.06 per cent) with 20 per cent ethanol. On the basis of desorbed anthocyanins content and L, a, b colour values, adsorption with 35% XAD-16 for 8 hours followed by desorption with 60% ethanol was found to be the best method for the extraction of plum anthocyanins. Anthocyanin extract was heated at different temperature viz. 80°, 100° and 120°C for 10 and 20 min to determine its thermal stability. A marked degradation of anthocyanins took place at higher temperatures than lower ones. Stability of anthocyanins was decreased with the increase in temperature and heating time. It is concluded that the adsorption of anthocyanins by using XAD-16 was a suitable method for its extraction. The anthocyanins extract was found to be stable to heating as reflected by 'L', 'a' and 'b' value. Therefore, plum pomace

can be utilized for the production of biocolour for the food industry.

Key words: Plum, anthocyanins, adsorption, stability, colour value.

FEB-O-18

DEVELOPMENT AND EVALUATION OF BLENDED FRUIT AND VEGETABLE JUICES

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The present study was aimed to the formulation of antioxidant rich natural juice blends of apple fruit owing to its high functional value due to the presence of bioactive compounds. Suitability of the juice blends prepared by blending of Apple and Jamun juice was evaluated. Blending of Apple and Jamun juice in 90: 10 proportions gave highest sensory acceptability. This juice blend was further used for the blending with juices/pulps of vegetables viz. bottlegourd, bittergourd and tomato. Highest sensory acceptability was recorded for the Apple: Jamun: Bottlegourd, Apple: Jamun: Bittergourd and Apple: Jamun: Tomato blends prepared in the proportions of 81: 9: 10, 85.5: 9.5: 5 and 85.5: 9.5: 5, respectively were adjudged best. The blends were filled in pre-sterilized glass bottles, processed and stored up to 6 months at 25°C and 4 °C temperatures. Highest total phenolics content and antioxidant activity was recorded in Apple: Jamun: Tomato juices blend as 235.69 mg/100ml and 74.73%, respectively. Quality evaluation of juice blends showed significant changes in ascorbic acid, total phenolics, anthocyanins and antioxidant activity upon storage. The results indicated that fruit and vegetable based natural juice blends rich in bioactive compounds having high antioxidant potential can replace the synthetic beverages besides, shall also make available a variety of natural fruit and vegetable juice choices at reasonable expenses to the domestic consumers and export purpose.

Keywords: Jamun, apple, antioxidant activity, and juice blends, vegetable juices, functional foods.

FEB-O-19

BENCHMARKING: FRUIT FLAVOURED YOGHURT AVAILABLE IN DELHI AND DELHI-NCR

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Yogurt is a cultured dairy product made by fermentation of heated milk with lactic acid bacteria. Yoghurt market in India is growing at a rate of about 40% and is revered as a functional superfood, claiming a number of health properties. Fruit yoghurt is sold in the marketed with different claims including its probiotic nature, added natural fruits, natural colour, preservative free and others. Textural and rheological properties play a very vital role for evaluating the quality of the fruit yoghurts by the consumers, so the present study was focused on conducting a benchmark study of the sample available in the market. The samples were evaluated on different physico-chemical, microbial parameters, rheological properties and nutritional claims. Steady state rheology, time dependency and dynamic rheology was conducted at 5 different temperature levels (5, 10, 15, 20 and 25°C) and all the samples showed the apparent viscosities decreased with increasing shear rate. This indicated the set yoghurt samples had a shear thinning behavior. The viscoelastic characteristics of all the samples had Linear Viscoelastic Region (LVR). We found that Properties of fruit yoghurt mainly depends upon the composition, force applied and operational temperature.
Key words: Steady state Rheology; Dynamic rheology; LVR.

FEB-O-20

DETECTION OF SALMONELLA TYPHIMURIUM FROM BROILERS TARGETING fimA AND stm4497 GENES AND THEIR DECONTAMINATION ON DRESSED CHICKEN SKIN SURFACE USING ANTIMICROBIALS

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Salmonella is one of the most significant food-borne pathogens from poultry origin having great human health importance. Among *Salmonella* serovars, *Salmonella* Typhimurium has emerged as the most predominant serovars of poultry origin in India. Sources of contamination of *Salmonella* are external surfaces, faecal material of the birds and the processing environment. Adaptation of bacterial pathogens to environmental stresses has led to developing concern for their eradication in foods. Therefore, a study has been designed to detect *Salmonella* Typhimurium (ST) using PCR technique targeting fimA and stm4497 genes broiler birds to assess efficacy of antimicrobials in decontamination

of *Salmonella* Typhimurium. The results of this study indicated primers developed for fimA and stm4497 genes of *Salmonella* Typhimurium were found specific for targeted serovar. Other *Salmonella* positive isolates did not give result with these primer pairs, indicating specificity of primers for *Salmonella* Typhimurium. Acidified sodium chlorite (ASC) was used in different concentrations (0, 100, 200 and 300ppm) in combination with thermal treatments (56, 60 and 64°C) to decontaminate the artificially inoculated *Salmonella* Typhimurium on dressed chicken skin and the results revealed that application of ASC at 100 ppm in combination with thermal treatment was able to destroy *Salmonella* on chicken skin although at 56°C D-values were lower for higher concentrations of ASC used. Based on these results in can be conclude that the PCR technique targeting fimA and stm4497 genes can be used in specific detection of *Salmonella* Typhimurium and the antimicrobial can be applied in hygienic production of dressed chicken meat.

FEB-P-01

EVALUATION OF DIFFERENT METHODS OF ANALYSES FOR THE DETECTION OF YERSINIA ENTEROCOLITICA IN MILK PRODUCTS

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Yersinia enterocolitica, one of the emerging food borne pathogens is now recognized as leading cause of acute gastroenteritis and several food-associated disease outbreaks in human beings worldwide. Owing to the public health significance, a total of 2,431 samples of milk and dairy products in Chennai, India, were examined for the presence of *Yersinia enterocolitica*. Out of 29 presumptive isolates, twenty (19.42%) were identified as *Yersinia* sp. (9 *Y. enterocolitica*, 6 *Y. frederiksenii* and 5 *Y. kristensenii*) by biochemical method, whereas, only 18 (including 7 *Y. enterocolitica*) by kit method. On PCR amplification for species specific 16S rRNA gene and virulent genes specific for pathogenicity, nine were confirmed as *Y. enterocolitica* including 4 as pathogenic. In multiplex PCR, the same 4 pathogenic isolates harboured one to four virulent genes either alone or in combination. Though the number of *Y. enterocolitica* isolates identified in all three methods was almost same, it is concluded that molecular method is superior, as it not only detects the presence of *Y. enterocolitica* but also their pathogenicity with more specificity and rapidity.

FEB-P-02

PREPARATION OF WHEY POWDER AND IGG ENRICHED WHEY COLOSTRUM POWDER FROM GOAT COLOSTRUM

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Goat colostrum whey powder and IgG enriched whey colostrum powder an alternative source of passive immunity for human neonates was prepared using goat colostrum. Colostrum-based products are commercially available as a health food supplement and are marketed as a general “health promoting” products. The study was conducted on fifteen Sannen x Beetal and fifteen Alpine x Beetalcrossbred dairy goats. Goat whey colostrum powder was prepared directly from whey by lyophilization and IgG enrich whey colostrum powder was prepared by ultra filtration of whey by using 100 kDa membrane. Lyophilized whey and IgG enriched whey colostrum powder had higher IgG concentration ($P<0.05$) and protein ($P<0.05$) as compared to the raw colostrum. 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. The objective of this study was to prepare the whey powder and IgG enriched whey colostrum powder from goat colostrum.

FEB-P-03

BIOTECHNOLOGY IN FUNCTIONAL FOODS AND NUTRACEUTICALS

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Biotechnology is the rapidly expanding field of science with many different applications. One area of application is in the production of new varieties of food and drinks either by improvement over conventional techniques or by genetically modifying the product themselves or producing those using genetically modified organisms or their products. Biotechnology in the functional foods and nutraceuticals targets improving the health and reducing disease risk through prevention. Foods qualify as “functional foods” because they contain substances with potential health benefits, for e.g. Soy foods (isoflavones), Cranberry juice (proanthocyanidins), Jamun (anthocyanin), Golden Rice (beta-carotene), Tomatoes (lycopene) and Yoghurt (probiotics) etc. The main challenges while formulating the biotechnology in functional foods and nutraceuticals are complex series of biochemical reactions, lack of knowledge,

lack of methods of handling and measurement, bioavailability issue, and difficulty in identifying elements underlying the nutritional problem. In view of many medicinal and therapeutic properties of *Jamun* and seasonal availability, an attempt has been made to prepare wine from its juice since wine has longer shelf life than fruit juices and retains all the nutrients. It was observed that *Jamun* wine was quite acceptable and acceptability of wine was increased with storage. Biotechnology holds great promise for the future and to improve the health benefits of functional foods. Biotechnology advances will enhance the functional food value in the food industry.