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Scientific Tracks & Abstracts

Day 1

Adrian L Kerrihard et al., J Exp Food Chem 2018, Volume: 4
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Mathematical modeling of the chemical and sensory changes within almonds throughout storage

Adrian L Kerrihard[1], Daniel R Parrish[2], Anna N Cheely[2], Ronald B Pegg[2], William L Kerr[2], Ruthann B Swanson[2] and **Guangwei Huang[3]**
[1]Montclair State University, USA
[2]University of Georgia, USA
[3]Almond Board of California, USA

Statement of the Problem: In the industry, almonds are exposed to a variety of storage conditions that can greatly influence the rate of quality degradation. To date, little work has quantitatively modeled these effects on quality over time.

Methodology & Theoretical Orientation: Roasted almonds were stored in either high-barrier bags (HBB; n=4) or polypropylene bags (PPB; n=7) at 15, 25, or 35°C and 50 or 65% RH, and at 4°C with no RH control. Raw samples were held in either unlined cardboard cartons (UC; n=7) or PPB (n=7) under identical conditions. Almond quality was assessed bimonthly by measures of oxidation products, free fatty acids, moisture content, water activity, and sensory evaluation. Rates of change over time for each attribute were modeled with univariate analyses, and the slopes from these models were then predicted by multivariable analyses according to storage conditions.

Findings: The models showed higher temperatures predicted greater rates of quality degradation for all measures. Storage in HBB (rather than PPB) mitigated decline in consumer acceptability at a magnitude comparable to that of a decrease in storage temperature of 15–25°C. Use of HBB (rather than PPB) was also associated with a reduction in expected peroxide formation by a magnitude comparable to a reduction in storage temperature of 25°C. Storage in PPB (rather than UC) was associated with a reduction in expected peroxide formation by a magnitude comparable to a reduction in storage temperature of 20°C.

Conclusion & Significance: The models quantitate the deleterious effects of higher storage temperatures and suboptimal packaging conditions. The benefit of HBB packaging is substantial, but there is an associated cost with employing this packaging. Industry members can use these models to make highly informed decisions about storage and packaging strategies.

Biography

Adrian L Kerrihard is an Assistant Professor of Food Science at Montclair State University in New Jersey. His research background is in food stability, chemical analysis, sensory evaluation, and mathematical modeling. His more recent work has focused on food processing variables and how these relate to flavor chemistry outcomes and nutritional attributes.

kerriharda@montclair.edu

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The design of peptide-based hydrogels and the characterization of their physiochemical and release kinetic properties for applications in austere food environments

Nicole Favreau-Farhadi[1], **Matthew Gage**[2] and **Ann Barrett**[1]
[1]US Army Natick Soldier RDE Center, USA
[2]University of Massachusetts Lowell, USA

Introduction: Nutritive and bioactive compounds that are purported to promote health, prevent disease, and preserve food are highly reactive to food matrices and environmental stressors which lead to degradation. A hydrogel is a type of encapsulation technology which is a networked structure capable of holding a large amount of water while forming a three-dimensional protective network capable of swelling or diffusing reversibly in water. They can be designed to shrink or expand in response to changes in the external environment to protect the compounds from stressors and then release them at the intended biological target. Here, we created novel hydrogels produced from electrostatic peptides found in human muscle, one rich in negatively charged glutamic acid and the other in positively charged lysine. Due to their amphiprotic peptide base, these hydrogels can be tailored to accommodate individual compounds and/or food matrices.

Concept: Although diffusion of the compounds is thermodynamically driven by concentration, it can be kinetically controlled. Further, the diffusion of core compounds in and out of the hydrogel will be a function of charge. Less diffusivity and stronger tortuosity result with crosslinked hydrogels with varying charges and peptide concentrations.

Methodology: The hydrogels are engineered in highly purified water with varying peptide concentrations, salt triggers and crosslinkers. Properties were measured via stress and strain curves, elastic modulus, viscous modulus, FTIR, swelling studies, and release rates. Enthalpy/crosslinking degree, thermal decomposition, and phase transition were measured via TGA and DSC.

Results: The peptides are excellent shell materials in creating robust, tunable hydrogels. The diffusivity and tortuosity can be kinetically controlled by varying the peptide concentration, as well as customized to different charged compounds. The increase in G enthalpy, Amide I bond shifts, and transition temperatures corroborated the mechanical strength increase of the higher concentration hydrogels.

Biography

Nicole Favreau-Farhadi is pursuing her PhD at the University of Massachusetts/Lowell researching novel hydrogels. She has served as Project Officer, Primary Investigator, Lab Manager and Analytical Chemist for 15 years for the Department of Defense (DoD) and is a subject matter expert in non-thermal processing, phenolic activity, browning mechanisms and preservation technologies. Her research and scientific contributions to the Department of Defense (DoD) Combat Feeding Research and Engineering Program have been pivotal to the DoD's mission of novel food processing, preservation and performance nutrition. Her many accomplishments have been documented in peer-reviewed journal publications, book chapters, multiple patents, notable accolades, industry interviews and numerous professional briefings.

nicole.f.farhadi.civ@mail.mil

Notes:

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Particle formation using supercritical fluid technology to enhance the quality and health benefits of lipophilic bioactive compounds

Ozan N Ciftci
University of Nebraska-Lincoln, USA

The potential health benefits of many lipophilic (water-insoluble) bioactives with disease-fighting potential are not fully realized due to their low bioavailability, which is caused by their poor water solubility. Despite limited efficiency up to this point, lipophilic dietary bioactives hold great potential to combat disease, as the increased prevalence of diet-related illnesses (e.g., gastrointestinal health problems, inflammation, and obesity) and the growing demand for natural foods have negatively impacted the acceptability of foods containing artificial ingredients. Moreover, many of the lipophilic bioactives are chemically unstable; means they degrade during processing and storage and affects food quality negatively. Therefore, there is a critical need for the development of technology-driven foods that will enhance the quality and health benefits of the lipophilic bioactives. This presentation will demonstrate our innovative approaches based on supercritical fluid technology to form micro- and nanoparticles to deliver bioactive lipids and lipophilic bioactive compounds, and to improve their health benefits by improving their bioavailability. Case studies on development of hollow solid lipid micro- and nanoparticles to deliver fish oil and essential oils, and formation of low-crystallinity phytosterol nanoparticles using nano porous starch aerogels will be presented. These innovative approaches have the potential bolster the agro-industry by transferring this green technology to food manufacturers and by maximizing the use of bioactive compounds derived from agricultural products. They will also improve nutrition and health by addressing the chief limitation that poor bioavailability of many lipophilic bioactive compounds.

Biography

Ozan N Ciftci is an Assistant Professor in the Department of Food Science and Technology at the University of Nebraska-Lincoln, United States. Research in his Lab is focused on developing novel green approaches to enhancing the health benefits and quality of the food lipids. To achieve this, he is using approaches based on nanoscale science and engineering, and supercritical fluid technology. He is also interested in the fundamentals associated with the novel process development. More specifically, research in his lab is focused on two key areas: lipid particle formation and green extraction of bioactive lipids.

ciftci@unl.edu

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Essential chemicals in kale can be altered by natural amendments

Lord Abbey and **Raymond H Thomas**
[1]Agricultural Campus, Dalhousie University, Canada
[2]Memorial University of Newfoundland, Canada

Plant growth, yield and quality responses to natural amendments have been widely studied. However, little is known about alterations in essential phytochemicals in response to different types of natural amendments. A greenhouse pot-experiment was performed to determine the influence of three different natural amendments: dry vermicast, potassium (K)-humate and volcanic mineral and a control (no amendment) on the chemical composition of kale (*Brassica oleracea* L. var. *Acephala* '*Ripbor*'). Plants grown in the dry vermicast had the highest amounts of essential macronutrients followed by volcanic mineral, while the least was found in the control plants. The essential micronutrients, manganese and copper, were also high in the dry vermicast. Additionally, the levels of polyunsaturated fatty acids and monounsaturated fatty acids were in the kale plants were increased following the application of dry vermicast and volcanic mineral, but not K-humate. Plant tissue content of omega-3 fatty acids were high in the dry vermicast and low in the K-humate and the volcanic mineral treatments. Omega-6 fatty acids were unaffected by treatment differences. Total phenolic content and antioxidant capacity were highest in plants treated with K-humate, and the least was recorded by the dry vermicast treated plants. In conclusion, dry vermicast proved to be the most efficacious in enhancing the overall phytochemical composition of kale 'Ripbor' as compared to the other natural amendments.

Biography

Lord Abbey has a background in Plant Science and Pharmaceutical R&D with a research focus on sustainable food systems and compost quality enhancement for health and wellbeing. He has completed his BSc (Hons) Agriculture from the University of Ghana. He has continued his studies in the UK, The Netherlands and Canada. He is currently a Professor at Dalhousie Faculty of Agriculture where he teaches and supervises undergraduate and graduate students. His research program is in Plant Nutrition and Physiology. Some of his current research activities include exploration of ethnic crops in NS; aromatic and medicinal plants; onion fertilization and postharvest losses; and value-addition and alternative uses of compost and vermicompost. He is a Board Member of Living Earth Council; Member of the Nova Scotia Institute of Agrologists (NSIA); the International Society for Horticultural sciences (ISHS); and the Canadian Society of Horticultural Science (CSHS). His passion is travelling and nature-walk.

labbey@dal.ca

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Extraction techniques of anti-nutritive and toxic factors in the leaves of the white flowering *Nerium oleander L.*

K G Kgosana
ARC- Onderstepoort Veterinary Research, South Africa

Plant poisoning is a serious concern across the globe. However, most livestock animals in the sub-Saharan African countries still depend on browsing on tree fodders to maintain their normal physiological processes due to high costs of animal feeds and all resources required for feed production. Conversely, plants contain endogenous toxins commonly referred to as anti-nutritive factors (ANFs) that often interfere with utilization of nutrients and/or feed/food intake of plants or plant products. Their abundance frequently leads to massive clinical trauma resulting in high morbidities and mortalities. Hence, the objective of the study was to do preliminary screening of the extraction techniques of the white flowering *Nerium Oleander* L. (Apocynaceae) and commercial feeds. Organic (hexane, acetone and methanol) sequential and aqueous (infusion and decoction) extractions were explored. Subsequently, a qualitative and HPLC quantitative analysis was carried out to compare contents of ANFs where the Mann Whitney U statistical tool was used at a threshold level of 0.05. The results showed higher extraction yields in all aqueous extractions. Therefore, an infusion may be considered as the best approach to mitigate plant poisoning due by ANFs in plants since it proved to be an efficient, safe and reliable method. Furthermore, although the results were not so significant ($p<0.05$), a high saponin content of 0.113±0.104 mg/g in diosgenin equivalent was obtained in commercial feeds. In addition, LC-MS will be conducted to characterise the quantified ANFs from the sample.

Biography

Kedibone Gloria Kgosana has her expertise in Natural Science. During the development of her career, she explored various fields of study such as chemistry, biochemistry, plant biotechnology and phytomedicine. After few years of experience in research and veterinary toxicology, the recent climatic change in South Africa which had major implications on the feeding patterns of livestock in the rangelands where there is no proper management prompted her to find solutions to mitigate the effects. Hence she developed strategies to remove or reduce the anti-nutritive and toxic factors in plants that pose a major risk in the livestock. The strategies are responsive to all stakeholders and would improve animal health and production.

mawelakg@arc.agric.za

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The right to food and nutrition security

Sakhidad Abrar
UN Women, Afghanistan

The right to adequate food is a universal human right that is realized when all people have physical and economic access at all times to adequate food or the means for its procurement, without discrimination of any kind. Despite progress made in reducing chronic hunger, undernourishment still affects at least 793 million (2015) people worldwide. Guaranteeing fair access to resources, rural employment and income are key to overcoming hunger and food insecurity. In 2017, around 124 million people in 51 countries faced Crisis food insecurity or worse. Heads of State and Government in the Rome Declaration "reaffirmed the right of everyone to have access to safe and nutritious food, consistent with the right to adequate food and the fundamental right of everyone to be free from hunger." *The right to food and nutritious security has been proclaimed at international treaties such as* International Covenant on Economic, Social and Cultural Rights, *United National Human rights Declaration* (UDHR), and UN Charter. In Afghanistan around, 39 percent of Afghans live below the poverty line, with huge differences in living standards between those living in cities and those in rural areas. The country has some of the world's highest infant, child and maternal mortality rates, and many thousands of children die needlessly each year because they lack access to adequate food and nutrition. Around 41 percent of Afghan children under the age of five are stunted, with low height for their age, while 10 percent are acutely malnourished. Around 33 percent of Afghans are food insecure – around 9.3 million people – and some 3.4 million of them are severely food insecure. The right to adequate food is realized when every man, woman and child, alone or in community with others, has the physical and economic.

(General Comment 12 of CESCR)

Dissertations:

- Transition from traditions toward modernism
- Afghanistan International Human Rights and state Obligation
- International Criminal Court and its jurisdiction authority
- International Dispute resolution,
- United Nation Environmental Protection
- UN human rights council
- Technical paper on gender and legislation
- The rights of accused and suspect during court proceeding
- Training Manual on human rights and state obligation

Biography

Sakhidad Abrar has joined UN Women Afghanistan on 2015 as National Rule of Law program Officer with focusing on Ending Violence against Women, gender equality and women empowerment. Before he was working with UNDP Justice and Human rights project based in the Ministry of Justice on state human rights obligation enhancement. He has known as women and human rights activist, has provided extensive technical and substantive support to government entities and CSOs at policy and strategy level with focusing on and human rights, women rights, rule of law and food security. He has voluntarily contributed technically in providing mentorship, training programs and curricula development on various arena with USAID promote project, Canadian embassy, and civil society organizations. He has obtained certificate on "*right based approach to food and nutrition security*" from the Center for Development Innovation, Wageningen UR based in Netherlands. He holds Master on international law, a bachelor on law and political science and long-term certificate on project management, policy and M&E.

abrarsakhi@yahoo.com

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Whey protein based microencapsulation of bioactive compounds and probiotics

Mingruo Guo[1,2] and **Mu Wang**[1]
[1]Northeast Agricultural University, China
[2]The University of Vermont, USA

Ginsenosides is a group of the bioactive compounds in ginseng. Its application in functional dairy foods is limited due to the bitter taste and yellowish color of ginsenosides. Using polymerized whey protein as the wall material to capsulate ginsenosides may effectively mask its bitter taste and improve the color. Probiotics are widely used in functional fermented foods. Polymerized whey protein based microencapsulation of probiotics might improve their survivability during digestion. The results showed that entrapment yield of the microencapsulated ginsenosides and *Lactobacillus Acidophilus (L. Acidophilus)* was 95.46±1.95% and 92.90±3.97%, respectively. The probiotic yogurt chemical composition, texture, syneresis, viscosity and sensory properties were analyzed and compared between the experimental sample and the control. There was no significant difference in moisture and ash content between the experimental and the control sample ($p>0.05$). The yoghurt with microencapsulated ginsenosides displayed the higher viscosity, gumminess, hardness and adhesiveness. The syneresis of experimental sample was significantly lower than that of the control ($p<0.01$). Sensory evaluation (score scale 1-5) showed that the acceptability score of the experimental yoghurt (3.7) was much higher than the control (1.6). The population the probiotic was above 106 CFU/ml in the yoghurt for the first six-week storage. Results showed that the microcapsules of *L. Acidophilus* were intact after treated by gastric juice but *L. Acidophilus* were released in the small intestine juice while the free cells had died out. The results indicated that the polymerized whey protein based microencapsulation might be an effective technique to mask bitter taste and improve the color of probiotic yoghurt containing ginsenosides. They could be released from the capsules in small intestine. And the polymerized whey protein based microencapsulation might protect *L. Acidophilus* from the acidic gastric juice.

Biography

Mingruo Guo, a food chemist and a full Professor in the Department of Nutrition and Food Sciences at the University of Vermont (UVM), USA. He holds a Ph.D. degree in Food Chemistry from the National University of Ireland at Cork in 1990. Dr. Guo`s scholarly interests include human milk biochemistry and infant formula manufacturing technology, functional foods, the utilization of whey protein in creating functional foods and environmentally safe products; biochemistry and technology of fermented dairy products. He published the first textbook on functional foods in the US in 2007 another book titled: Human milk Biochemistry and Infant Formula Manufacturing Technology was published in 2014. He has published more than 150 research articles, book chapters and conference proceedings.

Ming.R.Guo@uvm.edu

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Workshop

Day 2

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Gustavo V Barbosa-Cánovas

Washington State University, USA

Breaking the ice with nonthermal processing

The challenge that food processors have faced for many years to manufacture safe but not over processed foods was, in principle, without a clear solution. Efforts to improve thermal processes rendered promising results, but the outcomes were not satisfactory for consumers looking for fresh-like quality and wholesome products. In response to these consumer demands, a number of strategies to inactivate microorganisms, none of which were based on the use of heat, were explored by an overwhelming number of research and development groups well scattered around the world. Some of these nonthermal approaches offered very promising results, mainly for pasteurization and decontamination. Pulsed electric fields, pulsed light, ultrasound, and high hydrostatic pressure, among others, were some of the technologies that offered sound alternatives for processing the foods of the future. This "revolution" in the food world opened the way to not only in processing foods by innovative methods, but also offering the possibility of attaining new products, updating regulations, modifying concepts about inactivation mechanisms, and initiating the advent of nonlinear inactivation kinetics, to name a few. This presentation reviews some of the major developments that have taken place over the last 25 years to make nonthermal processing of foods the most significant contribution of the century to further advance food science and engineering.

Biography

Barbosa is director of the Center for Non Thermal Processing of Food (CNPF) and works in the BSysE Food Engineering research emphasis area. His primary interest is in finding effective and less harmful methods of preserving food through the study, development, and application of nonthermal technologies.

barbosa@wsu.edu

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Ozlem Tokusoglu

Celal Bayar University, Turkey

Agri-food chain wastes and food by-products: Importance on nutrifood chemistry and anticarcinogenity

Most food waste derivatives from the drink industry (26%), followed by the dairy and ice cream industry (21.3%), the production and preservation of fruits and vegetables (14.8%), the manufacture of grain and starch products (12.9%), the production, processing and preservation of meat products (8%), the manufacture of vegetable and animal oils and fats (3.9%), the production and preservation of fish and fish products (0.4%). Bioactive constituents potentially extractable from the targeted plant food by-products include majorly phytochemicals, fibers, natural flavor compounds, sugars, polysaccharides, ethanol, and proteins and its derivatives. The solid by-product, often called as ''waste" or ''pomace", is obtained by pressing of fruits or vegetables and can contain pulp, peels, seeds and, stones. The processing of fruits and vegetables results in high levels of waste materials including peels, seeds, stones, and oilseed meals. In the innovative technologies, new aspects regarding the utilizing of above-mentioned wastes as by-products for further exploitation on the manufacturing of high-value products, food additives or supplements with high nutritional value. Especially stone fruits including apple, pear, citrus fruits, grape, tomato, tropical fruits including mango, aggregate fruits including pomegranate, berry fruits, olive and coffee, red beet, artichoke, asparagus, celery, endive, chicory, cucumber, broccoli are important fruit and vegetable sources that are given efficient by-products. By-products of fruit and vegetable as a sources of majorly phenolics and dietary fibre and minerals that have a wide range of action which includes antitumoral, antiviral, antibacterial, cardioprotective and antimutagenic activities. The animal-derived wastes include wastes from bred animals, wastes from seafood, and wastes from dairy processing as thirdly. The recovered biomolecules and by-products can be used to produce functional foods or as adjuvants in food processing or in medicinal and pharmaceutical preparations. Seafood product processing discard account for about three-quarters of the total weight of catch. Seafood processing has also been used as a possible waste utilization. It is known that the major components of seafood discard products are tongue, cheeks, stomach, liver of fish, protein bioactives from residual fish, marine bioactive lipid components (omega 3,6, DHA,EPA), fish skin, carotenoid bioactives and chitinous materials from shellfish products, gut enzymes, flavor products, anti-freeze proteins from seafood blood. Fish skin waste could be used as a potential source to isolate collagen and gelatin. Fish collagen and gelatin are currently utilized in diverse fields containing food, cosmetic, and biomedical industries. Collagen and gelatin are unique proteins compared to fish muscle proteins and they are generally rich (above 80%) in non-polar amino acids including glycine (Gly), alanine (Ala), valine (Val), proline (Pro) aminoacids whereas gelatine geerally contains glycine unites, proline and 4-hydroxyproline residues. Collagen and gelatin could be also isolated from bone and fins of fish processing by-products. Astaxanthin (3,3-dihydroxy-β,β-carotene-4,4-dione) from seafood by-products is a ketocarotenoid oxidized from β-carotene, that plays biological roles and possesses a number of desired properties for food and medical applications owing to it is natural ketocarotenoid, nontoxic, high versatilite, hydro and liposolubility property, its attractive pink color, its biological functions as vitamin A precursor and superior antioxidant characteristics. Appropriate utilization of meat by-products is important for the profitability of the meat sector. Meat by-products are produced by slaughter houses, meat processors, wholesalers and meat rendering plants. It is reported that by-products including organs, fat or lard, skin, feet, abdominal and intestinal contents, bone and blood of cattle, lambs and pigs represents 66.0, 68.0 and 52.0% of the live weight, respectively. It is determined that many organ meats contain more polyunsaturated fatty acids (PUFAs) than lean tissue while brain, chitterlings, heart, kidney, liver and lungs contain lowest level of monounsaturated fatty acids (MUFA) and the highest level of polyunsaturated fatty acids (PUFA). Bioactive peptides generally

contain between 3-20 amino acid residues and various generated peptides are denominated bioactives peptides due to their determined health benefits to the consumers like antihypertensive activity. It is stated that main by-products of dairy industry are whey, buttermilk, ghee residue and sometimes skim milk. The techno-economic issues connected with the utilization of dairy by-products and remarkable progressions have been made in processing equipments. It is reported that whey protein hydrolysates enriched in free amino acids (AAs) and hydrophilic peptides could have been responsible for the rised insulinotropic response of BRIN-BD11 cells. In this context, the potential utilization of whey protein hydrolysates and peptides can be performed as natural complementary approaches; these could be implemented through dietary intervention and food-drug therapies for type 2 diabete management by inhibiting DPP IV activity and thence increasing the half-life of incretin hormones.

Biography

Ozlem Tokusoglu has completed her PhD at Ege University, Department of Food Engineering in 2001. She is currently working as an Associate Professor at Celal Bayar University, Department of Food Engineering. She was Visiting Scholar in Food Science and Nutrition Department at University of Florida, USA during 1999-2000 and as Visiting Professor at the School of Food Science, Washington State University, Washington, USA during April-May 2010. She has published many papers in peer reviewed journals and serving as an Editorial Board Member of selected journals. She has published two international book entitled Fruit and Cereal Bioactives: Chemistry, Sources and Applications; Improved Food Quality with Novel Food Processing and; Food By-Product Based Functional Food Powders. She also published two national books entitled Cacao and Chocolate Science and Technology and Special Fruit Olive: Chemistry, Quality and Technology. She has organized and/or administered as Conference Chair at many conferences and congress in various parts of USA, Europe and Asia-Pacific.

tokusogluozlem@yahoo.com

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Nutrition and functional potential of underutilized *Chenopodium album* and its applications

Sukhcharn Singh
SLIET, India

Plant foods have been and continue to be ingested due to perceived medicinal and health-benefiting characteristics. Currently attention is being drawn towards exploring plant sources for substances that provide nutritional and pharmaceutical advantages to humans. *Chenopodium album* is an important vegetable and grain crop that is widely distributed as well as grown in the Himalayan region. It is a good source of minerals such as (Fe, Zn, Mn & Cu) vitamins (vitamin E, vitamin C & β-carotene), high quality protein containing 17 kinds of amino acids including 7 essential amino acids for the human body, carbohydrates, the total lipid, crude lipids and natural antioxidants. The fat content of its seeds is 7% including palmitate, stearic acid, oleic acid, linoleic acid and linolenic acid, but linoleic acid and linolenic acid are the essential fatty acid for the human body, especially linoleic acid content attains 53.86%. Phytochemical analysis revealed the presence of alkaloids, apo-carotenoids, flavonoids, phyto-ecdysteroids and an unusual xyloside in the plant. Various bioactivities such as antifungal, antipruritic, antinociceptive and hypotensive properties of crude and isolated compounds from the plant justified its uses in traditional medicine. A number of gluten free products can be developing by using the *Chenopodium* grains.

Biography

Sukhcharn Singh is currently affiliated to Department of Food Engg & Tech, Sant Longowal Institute of Engg. & Technology Longowal, India. He is continuing research in the specialized scientific area of Processing and Utilization of Pseudocereal, Development of gluten free products. Sukhcharn Singh is serving as an honorary reviewer for Journal of Food Processing & Technology & other reputed journals and has authored several articles along with chapters in different books related to Processing and Utilization of Pseudocereal, Development of gluten free products.

sukhcharns@yahoo.com

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A study on consumer's awareness of chemically treated fruits of Dhaka city in Bangladesh

Md. Faruque Hossain
American International University-Bangladesh, Bangladesh

Use of chemical in food and food adulteration has always been a long-standing issue of consumer in both developed and developing countries. Many different government bodies in segregated geographical regions instated laws and regulations in order to protect consumers from harmful effects of consuming toxic foods. The citizens of Bangladesh, however, are still in danger of consuming foods which are chemically treated with hazardous materials (such as calcium carbide, sodium cyclamate, cyanide and formalin, etc.). Adulteration of foods has become a national issue. Many different national newspapers are constantly reporting the use of malicious substances fruits, vegetables, fish, foods and foods stuffs. This problem is not only ignoring the human rights for safer food but also endangering public health seriously with numerous acute and chronic diseases. Our future generation will be seriously affected with vulnerable physical and mental growth inflicted by food adulteration; therefore, the research illustrates consumers' awareness of adulterated food items through a questionnaire of 950 respondents at Dhaka. The collected data was coded using SPSS Version 17 and analyzed for frequency distribution, cross tabulation and correlation analysis. Regression analysis was further used to analyze associate relationship between dependent variable and the independent variable. The results showed strong relationship between the dependable variable (awareness level) and the independent variables; i.e. sources of information ($r=0.93$, $p<.001$), awareness of chemical booths ($r=0.88$, $p<.001$) and awareness of laws ($r=0.82$, $p<.001$). However, it is concluded that consumption of adulterated food items severely affects the human health by producing many acute and chronic diseases; hence, it is very urgent to stop food adulteration. The Government of the People's Republic of Bangladesh should eradicate the practices of food adulteration to save the lives of citizens and hundreds of laws in the country including the new anti-formalin act 2014, but not many of them are enforced properly. Government should enact and implement these laws to ensure safe food without delay. Checking at the retail level not only will bring enough positive impacts but the whole supply chain from the producers and importers through wholesalers to retailers will have to be checked and cleaned. It also recommended that regular monitoring by appropriate agencies should continue it in a sustainable manner for controlling food adulteration.

Biography

Md. Faruque Hossain is currently the Professor of American International University - Bangladesh. He obtained his Doctorate Degree in Soil, Water and Environmental Sciences from Imperial College of Science, Technology and Medicine, University of London, UK under the British Government Scholarship. He also obtained his BSc (Honours) and MSc (Thesis Group) Degree from University of Dhaka. He has published more than 70 scientific articles in Elsevier and Canadian journals and written more than 15 books/reports for the various governmental and non-governmental organizations. Dr. Hossain received *Merit Award from Earth Science Sector Natural Resources Canada* for exceptional achievement in the Arctic land use change and greenhouse gas monitoring and accounting project. In May 2014, Dr Hossain received prestigious STEM Gold medallion by Coppin State University, Baltimore, Maryland, USA for the best research contribution in 2nd International Symposium on Sustainable Science, Technology, Human Health and Environment for a Global Society.

hossainfaruque@hotmail.com

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Antimicrobial activity of grape seed and skin extracts coated on corona treated LDPE and PET films

Nahla Mohamed Abdel khalek Khalil
American University, Egypt

Consumer demand for ready-to-eat 'fresh' and safe food products with less synthetic preservatives together with well documented food-borne microbial outbreaks drive both research and food industry toward new innovative methods for microbial growth inhibition while keeping food freshness, quality, and safety. Incorporation of natural bioactive agents in the packaging material to increase the shelf life of meat products is a promising technology. Grapes are of special interest because of their high content of phenolic compounds that showed antimicrobial and antioxidant effects. The aim of the present work was to investigate grape seed (GSE) and skin (GSKE) extracts' antibacterial activity and developing bioactive LDPE/PET films that could be used as food packaging for poultry and meat products. Commercial corona treated LDPE and PET were coated with either grape seed or grape skin extract. Agar plate diffusion method was used for the investigation of the microbial properties of both extracts' coated films against *E.coli* as a Gram-negative bacterium and *Staphylococcus Aureus* as a Gram-negative one. LDPE and PET films coated with GSE showed inhibition zones of *E.coli* growth in the range of 16-25mm, while *Staph.Aureus* growth inhibition zones were in the range of 15-20mm. For LDPE corona films coated with grape seed extract, the minimum inhibitory concentration (MIC) was 0.002g/1cm^2 for *E.coli* and 0.003g/1cm^2 for *Staph.Aureus*. While for corona treated PET films/GSE, the MIC for both *E.coli* and *Staph.Aureus* was 0.002g/1cm^2. Corona treated LDPE and PET coated with GSKE showed inhibition zone range of 13-16.3mm with *E.coli* and 12-20mm with *Staph.aureus*. For LDPE corona films/GSKE, the minimum inhibitory concentration (MIC) was 0.0009g/1cm2for *E.coli* and 0.003g/1cm^{2}for *Staph.aureus*. While for corona treated PET films/GSKE, the MIC was 0.002g/1cm^2 for *E.coli* and 0.003g/1cm2 for *Staph. Aureus*. The total phenolic content of both GSE and GSKE was determined using the Folin- Ciocalteu methodology to be 315.32g (GAE)/kg, and 265.326g (GAE)/kg for GSE and GSKE respectively. The coated films; LDPE/GSE or GSKE, were used to wrap fresh chicken fillets, TVC, Pseudomonads, Brochothrix thermosphacta, Lactic acid bacteria and Enterobacteriaceae counts were determined during the storage period; ten days for test samples and eight days for controls. Microbiological analysis for tested samples was done on day zero, two,four, six, eight, and ten, while for control till day eight. There was a reduction in the populations of the examined bacteria in the range of 0.2-1.4 log cfu/g in case of GSE, while with GSKE the reduction of bacterial populations range was 0.3-1.95 log cfu/g.

Biography

Nahla Mohamed Abdel khalek Khalil has completed her MS in Food Chemistry at American University in Cairo, School of Sciences and Engineering, Chemistry Department. She is a Research Assistant at Chemistry Department, American University in Cairo. She intend to complete her research focusing on the other important charcteristcs of both grape seed and skin extracts e.g. anticancer and antinflamatory.

nana@aucegypt.edu

Notes:

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Workshop

Day 3

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Ozlem Tokusoglu

Celal Bayar University, Turkey

Innovative mandarin peel effervescent tablet as antioxidant and anticarcinogen food supplement: Bioactive flavanones and phenolic acids by HPLC-DAD and LC-ESI-QTOFF-Mass spectrometry

Recently, the utilization of the potential bioactive phenolics has been the focus of attention owing to their consumption imparts health benefits including various cancer types, reduced risk of coronary heart diseases. Dietary supplements, food tablets, capsules and fortificated foods based on food by-product may be alternative for healthy public nutrition. Citrus is the largest fruit crop worldwide, with an annual production of approximately 100 million tons. The main world producers are Brazil, USA and mainly Turkey in Mediterranean countries. The citrus fruit mandarin (*Citrus reticulata*) residues, which are generally discarded as waste in the environment, can act as potential nutraceutical resources. Processing of mandarin by-products potentially represents a rich source of phenolic compounds, mineral, vitamin C and dietary fibre, due to the large amount of peel produced. Owing to their low cost and easy availability wastes are capable of offering significant low-cost nutritional dietary supplements. The utilization of bioactive rich citrus residues can provide an efficient, inexpensive, and environment friendly and healthy substances for novel nutraceutical manufacturing as mandarin peel tablet. In this patented research, we aimed to obtain potential healthy components from Seferihisar mandarin peel and Seferihisar mandarin peel based food tablet and also we identified in detail as quantitatively by HPLC-DAD and LC-ESI-QTOFF-Mass Spectrometry. In mandarin peel tablet, subsequent to fundamental chemical analysis (moisture, protein, ash, fat as 3.44%;5.09%; 29.65%; 0.40%, respectively whereas dried mandarin peel powder includes moisture, protein, ash, fat as 5.24%;4.55%; 3.41%; 0.00% ,respectively. In our mandarin peel tablet; sucrose, invert sugar and total sugar was found as 10.97%; 8.30%,; 11.54%,respectively whereas dried peel powder contained 17.71%; 10.02; 18.64% of level for mentioned sugars. Total fiber, acidity (as citric acid equivalent), pH of mandarin peel tablet was found as 3.03%, 2.74%, 5.96, respectively whereas in dried peel powder, 9.24%, 1.06% and 5.52, respectively ($p<0.05$). It was found that calcium (Ca), potasium (K), magnesium (Mg), aluminium (Al), phophorous (P) (mg/kg) of efervescent tablet was 4616.0; 2988.4; 417.2; 4.0; 367 mg/kg,respectively whereas 21916.9; 10204.0; 3459.6; 9.7; 572 mg/kg level was determined in dried mandarin peel powder, respectively. Potasium and magnesium were major minerals in innovative tablet ($p<0.05$). Vitamin C (ascorbic acid) was determined as 89.3 mg/100 g in mandarin peel efervescent tablet while 216.4 mg/100 g in dried peel powder. The avg.141.22 mg gallic acid equivalent phenolics [mg gallic asid equivalent (GAE) phenolic /100g] in mandarin peel effervescent tablet whereas avg.128.15 mg GAE /100 g in dried peel powder of Seferihisar mandarin ($p<0.05$). DPPH antioxidant activity (%) was found as 27.10% in innovative efervescent tablet and it was found 26.56% was in dried mandarin peel powder ($p<0.05$). Majorly L-ascorbic acid, citric acid, malic acid, succinic acid, galactaric acid, glucaric acid (Saccharic acid), glucaric acid lactone, p-salicylic acid as organic acids; (+)-naringenin, hesperedin, naringenin-7-O-glucoside, nobiletin , tangeretin, eupatorin (3',5-dihydroxy-4',6,7-trimethoxyflavone), gallic acid, p-coumaric acid, chlorogenic acid, caffeic acid, ferulic acid, quinic acid, rutin, diosmin flavone, casticin (methyoxylated flavonol) were determined as phenolics; also sucrose, , trehalose sugars and DL-phenylalanine, D-Tryptophan aminoacids were found by LC-ESI-QTOFF-Mass Spectrometry as qualitative and quantitavely. Major antioxidant phenolic was naringenin in mandarin efervescent tablet ($p<0.05$).

Scientific evidence shows that manufactured mandarin peel tablet can be used as dietary supplement and is beneficial for overall health and for managing some health conditions. By utilizing of Seferihisar mandarin peel, mandarin peel tablet was produced at DEPARK Technopark Spil Innova LLC as industrial health innovative. We revealed the chemical characterization, functional properties, its unique bioactive features and its comprehensive antioxidative, anticarcinogenic reports of new manufactured mandarin peel effervecent tablet.

Biography

Ozlem Tokusoglu has completed her PhD at Ege University, Department of Food Engineering in 2001. She is currently working as an Associate Professor at Celal Bayar University, Department of Food Engineering. She was Visiting Scholar in Food Science and Nutrition Department at University of Florida, USA during 1999-2000 and as Visiting Professor at the School of Food Science, Washington State University, Washington, USA during April-May 2010. She has published many papers in peer reviewed journals and serving as an Editorial Board Member of selected journals. She has published two international book entitled Fruit and Cereal Bioactives: Chemistry, Sources and Applications; Improved Food Quality with Novel Food Processing and; Food By-Product Based Functional Food Powders. She also published two national books entitled Cacao and Chocolate Science and Technology and Special Fruit Olive: Chemistry, Quality and Technology. She has organized and/or administered as Conference Chair at many conferences and congress in various parts of USA, Europe and Asia-Pacific.

tokusogluozlem@yahoo.com

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Investigation of interaction effects on antioxidant capacity of pairing foods and wines of the Spanish Mediterranean diet

Carol A Majkrzak, Douglas W Murray and **Adrian L Kerrihard**
Montclair State University, USA

Statement of the Problem: Recent research has shown that antioxidants may be vital to human health. Both foods and wines can be high in polyphenols, which inhibit oxidation in the body. However, no studies have looked at the possible interactions when foods and wines high in antioxidants are consumed together. Studies have shown that antioxidants can interact, but these interactions are not yet well understood. There is a specific interest in the possible interaction effects among components of the Mediterranean diet, as prior health studies have shown this diet to be associated with lower-than-expected mortality rates. The typical Mediterranean diet includes consumption of wine, but no studies have examined how these wines interact with the health properties of other components of the diet.

Methodology & Theoretical Orientation: Three foods (raw tomatoes, Spanish onion, and persimmons) and three wines (Tempranillo, Monastrell, and Grenache) common to the Spanish diet were assessed by Trolox Equivalency Antioxidant Capacity, both individually and in pairing combinations. Each food was paired with each wine and evaluated in triplicate. Interaction effects were assessed by one-way ANOVA (α=0.05).

Findings: Tomatoes showed negative interaction effects with all three wines. Spanish onions and persimmons showed a positive interaction effect with all three wines. The greatest interaction effect was observed between Persimmons and Tempranillo, which demonstrated antioxidant potential ~200% the value predicted for no interaction.

Conclusion & Significance: Consuming persimmons and Spanish onions with wine may increase the antioxidant potential, allowing for greater oxidation inhibition *in vivo*. Consuming raw tomatoes with wine may decrease the antioxidant potential. Further studies examining the interaction effects between antioxidant-rich foods and wines may be warranted.

Biography

Carol Majkrzak has recently graduated from Montclair State University with her Master's Degree in Nutrition and Food Science. She also completed her undergraduate program at Montclair State University in Nutrition with a concentration in Dietetics. Carol's research has focused on antioxidant capacity measurement, specifically looking at foods and wines in the Spanish Mediterranean Diet.

carol.majkrzak@gmail.com

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Potential impact of pollutants in potatoes, grown with wastewater, on human health

Harmanjot Kaur, Shiv Prasher, Stan Kubow, Danielle Donnelly, Jaskaran Dhiman and **Christopher Nzediegwu**
McGill University, Canada

Wastewater is increasingly becoming an alternate source of irrigation in parts of the world with declining freshwater sources. However, wastewater irrigation can also lead to accumulation of various inorganic (heavy metals) and organic (hormones and pharmaceuticals) pollutants in soil. Plants might uptake these pollutants and make their way into human body through food consumption, causing adverse health effects. This study is a part of a wastewater use project. The aim of this paper was to study the impact of heavy metal pollutants, taken up by potato tubers, on potato polyphenols and *in-vitro* digestion of potato meals in a simulated batch culture fermentation reactor. The antioxidant capacity of boiled, freeze-dried potato tubers was measured using ABTS, DPPH and Folin-Ciocalteu antioxidant assays. The average daily intake meals of potatoes were exposed to *in-vitro* enzyme digestion, followed by batch culture fermentation with inoculated fecal microbes. The samples were taken from the reactors after 0, 6, 12 and 24 hours of fermentation of the samples by the microbes. The samples were then analyzed for increase in short chain fatty acids (SCFA), antioxidant capacity and *Lactobacillus* spp. cfu under the combined toxic and protective effects of heavy metals and potato polyphenols, respectively. The bioaccessibility of heavy metals (Cr, Cd, Pb, Fe, Zn and Cu) was also measured using an ICP-MS. This study will provide an insight into the toxic effects of pollutants in food.

Biography

Harmanjot Kaur is passionate about Environmental protection and improvement. She is interested in working on interactive study of food, environment and toxicology. She is currently enrolled as Graduate student in Bioresource Engineering at McGill University, Quebec, Canada. She has undergraduate her degree in Agricultural Engineering from India.

harmanjot.khaira@mail.mcgill.ca

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Soya milk gelation with African catfish slime aliquots produces innovative integrated food emulsions

Oluwole, Adebanji Olasupo, Ikhu-Omoregbe, Daniel Imwansi, Jidean and **Victoria Adaora**
Cape Peninsula University of Technology, South Africa

African catfish slime is an extremely dilute, elastic and integrated hydrogel that disperses evenly in milli-Q water. The slime consists of mucosal glycoproteins and elongated filaments that traps water used to defend African catfish from attacks. Attenuated Total Reflection (ATR)-Fourier Transform Infrared (FTIR) spectroscopy a non-destructive analytical technique was used to confirm the wavelength peaks of glycoprotein functional groups. Deformation studies on African catfish slime showed it to be a non-linear viscoelastic material that displayed, shear thinning and pseudo-plastic behavior. Aliquots of the African catfish slime were dissolved in commercial soya milk (10% and 50% w/v) to combine functions of a dispersion and emulsion with those of the hydrogel. The aliquots of the African catfish slime had strong interactions with soya milk and displayed higher stability and viscoelasticity. The higher storage modulus of African catfish slime and African catfish slime-commercial soya milk suggested greater degree of cross-linking and explained the higher stability. African catfish mucin led to bridging and allowed flocculation to occur in the emulsion thereby forming an integrated emulsion and particle gel Slime –Soya at low temperatures. The combination of African catfish slime and commercial soya milk (Slime-Soya) had tofu like consistency and the method could be potentially used to produce innovative food emulsions with tofu-like integrated structures.

Biography

Adebanji Olasupo Oluwole was born in Lagos, Nigeria on 16 June 1974. He obtained a BSc (HONS) degree in Chemistry at the University of Lagos, Lagos, Nigeria and graduated with a First Class distinction in Food Science for his MSc degree at Stellenbosch University, Western Cape, South Africa. This led to a Golden Key Award because he was rated among the top best 5% students in his class. He is presently rounding off his PhD program at the Cape Peninsula University of Technology, Bellville, South Africa. He has a passion for research on the quality and packaging of food products such as fish.

adebanjisupotimilehin@yahoo.com

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Amelioration of allergic airway inflammation by fatty acids composition from sea cucumber

Da-In Lee and **Hak Sun Yu**
Pusan National University, South Korea

In a previous study, our research group demonstrated that sea cucumber (*Apostichopus japonicus)* extracts ameliorated allergic airway inflammation via CD4+CD25+Foxp3+ T (regulatory T) cell activation and recruitment to the lung. Here, we aimed to determine which components of sea cucumber contribute to the amelioration of airway inflammation. We used n-hexane fractionation to separate sea cucumber into three phases (n-hexane, alcohol, and solid) and evaluated the ability of each phase to elevate Il10 expression in splenocytes and ameliorate symptoms in mice with ovalbumin/alum-induced asthma. Splenocytes treated with the n-hexane phase showed a significant increase in Il10 expression. In the n-hexane phase, 47 fatty acids were identified. Individual fatty acids that comprised at least 5% of the total fatty acids were 16:0, 16:1n-7, 18:0, 18:1n-7, 20:4n-6, and 20:5n-3 (eicosapentaenoic acid). After administering the n-hexane phase to mice with ovalbumin/alum-induced asthma, their asthma symptoms were ameliorated. Several immunomodulatory effects were observed in the n-hexane phase-pretreated group, compared with a vehicle control group. First, eosinophil infiltration and goblet cell hyperplasia were significantly reduced around the airways. Second, the concentrations of Th2-related cytokines (IL-4, IL-5, and IL-13) and Th17-related cytokines (IL-17) were significantly decreased in the spleen and bronchoalveolar lavage fluid. Finally, the concentrations of TGF-β and IL-10, which are associated with regulatory T cells, were significantly increased in the bronchoalveolar lavage fluid and splenocyte culture medium. In conclusion, a fatty acid-rich fraction (n-hexane phase) of sea cucumber extract ameliorated allergic airway inflammation in a mouse model.

Biography

Dan-In Lee got her M.S degree at Pusan national university, school of medicine and she is pursuing her Ph.D course at Pusan national university, school of medicine, South Korea. Her major field of study is Immunology and Parasitology. Her experience includes various programs, contributions and participation in different countries for diverse fields of study.

lauranlee49@gmail.com

Notes:

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Consumption pattern of food away from home among households in Ogbomoso Metropolis, Oyo State

Ajayi O B[1], Oladimeji O O[2], Adegoke O A[3], Awofadeju J O F[1] and **Olarenwaju C M[1]**
[1]Forestry Research Institute of Nigeria, Nigeria
[2]Chapel Ville School, Lagos, Nigeria
[3]University of Ibadan, Nigeria

The study assessed the expenditure pattern of food away from home (FAFH) among household in Ogbomoso Metropolis. Eighty respondents were selected for the study (using purposive sampling technique and information was collected from the sampled respondents with the aid of structured questionnaire using descriptive statistics, statistic difference between two mean and multiple regression analyses. Socio economic characteristics of respondents which includes education level, sex, age, marital status, religion, occupation and annual income. The result of the study showed that 57.61% of the respondents spent average amount of Ń10,616.35 on food away from home while the remaining 42.39% of the respondents spent Ñ7,810.63 on food prepared at home. Regression analysis revealed that the age of the household (x2), household size(x5) and amount spent on food prepared at home (x7) significantly determined the amount spent on food away from home. The coefficient of determination of R2 is 0.574, which implies that about 57% of the variability in the amount spent away from home is explained by regressor. The t-statistic revealed that there is a significant difference between the amount spent on food away from home and food prepared at home. The respondent also identified stress in the food preparation (31.25%), job callers (16.25%), time constraint (26.25%) as some of the reasons for eating outside their house. The study revealed that, majority of people eats outside their home more than the rate at which they eat at home. The reason is because most women that are supposed to be home preparing food in the households are engaged in one work or the other. Also, time constraint was identified as one of the reason why many eat outside their home. Job calling have also led to increase in expenditure on FAFH. There are some other factors identified which include stress and persistent pleasant aroma leading to increase in expenditure on food away from home.

Biography

Ajayi O B is a Master Student (Msc) from Federal University of Agriculture in Nigeria. She is also working as a research scientist in Forestry research institute of Nigeria.

bussy_steve@yahoo.com

Notes:

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Assessment of nutritional status and major determinants of malnutrition in children under five years of age in Tongo Refugee Camp, Mao and Komo Special Woreda, Benishangul Gumuz Region, Ethiopia

Addisu Mengestie
Wollega University, Ethiopia

The study covers a review on the assessment of nutritional status and major determinants of malnutrition children less than five years of age in Tongo refugee camp. A cross-sectional quantitative study in which the results were triangulate with key informant interview and focus group discussions results was applied to accomplish the stated objectives of the study. A systematic random sampling method to select the sampling units was used to obtain the required number of subjects. Two hundred and forty children were randomly selected from the camps that were getting food and other material support from the camp. Regarding to food supply of the refugees in the refugee camp, the majority of the households depend on the ration distributed to them monthly based on the number of the members of the households. The ration distributed to the refugees has deficiency both in quantity and quality. As to the food supply indicators used in the survey, 25% of the children show malnutrition problem, and children were diseased in malnutrition and related disorders. As to the result of this study, of all the sample children in the refugee camp, prevalence of sever and moderate acute malnutrition were 7.5% and 18.5%. This shows that the situation is critical in the camp. Mothers or caretakers reported that 32.5% of children 6-59 months of age had been sick in the previous two weeks preceding the survey. Diarrhea disease was the most frequently reported illness, followed by fever, acute respiratory infection, and malaria. The result of the crude mortality rate during this period was 1.25%. The under-five mortality rate was also 0.77. The result of the bivariate analysis shows that there were seven variables found to have statistically significant relationship with malnutrition in the refugee camp. Using the logistic regression of multivariate analysis variables of disease (i.e. diarrhea and fever), age of the children and place of previous residence of the households were found with statistically significant effect on malnutrition compare to the other variables. This shows that food insecurity and diseases have high impact on malnutrition of the children. The effect of previous and present livelihood differences of the refugee households based on the households' previous place of residence was also affect to the resilience and adaptation capability of the refugees for the different problems in the camp. Recommendations target the improvement of the food allocation in the camp both in its variety and amount, the improvement and expansion of the therapeutic and supplementary feeding programs and treating malnutrition related diseases have to emphasize in the camp. Furthermore, water sanitation and hygiene programs have to expand to improve the ease of access and utilization of these services by the refugees.

Biography

Addisu Mengestie is a student at the Wollega University, Ethiopia. His experience includes various programs, contributions and participation in different countries for diverse fields of study.

addisu.mengestie@yahoo.com

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