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Refereed Abstracts

Sung-Jin Lee, Editor
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REFEREED ABSTRACTS - ORAL PRESENTATIONS
A Creative Project Using Natural Dyes

Avonee’ Simmons & DeNancy Brown, Meredith College
Project Advisor: Dr. Eunyoung Yang

Purpose and Rationale

Designers constantly stimulate their creativity by searching for new inspiration sources. Finding the right textiles and materials for a design is also very critical in the process of creating garments. Therefore, the fashion industry is expanding the variety of new and unique materials using fast pace, up-to-date technology. However, a noticeable portion of fashion industry is reintroducing natural dyeing techniques focusing on environmental sustainability. This research project is focused on exploring the sustainable practice of natural dyes while incorporating traditional Korean costume in a creative project.

Methodology

Seven natural dye substances were chosen and formulas to create dye solution were reviewed through literature. Certain dyes required an extraction process. These dyes included Alkanet, Gardenia Jasminosides, Gromwell, and Madder roots. Other dyes were already pre-extracted and came in a powdered form. Theses dyes included Cutch, Kamala, and Lac. The mordants used for each dye on Cotton and Raw silk were Alum, Copper, and Iron. A dye bath was created for each dye. All fabrics were pre-mordanted before being put into the dyebath for an hour. They were then rinsed until water ran clear. All fabrics were line dried overnight in a darker room and then machine washed. The draping and flat pattern techniques were used to create patterns from the design ideas for the garments. Fabrics that had the best dye quality were chosen for each individual to create the garments.

Findings

As a result, the color saturation of intended hues varied with the types of mordant used with each dye substance. We found that fabrics that were dyed with the alum mordant had a better quality and also those used without mordants. Iron and Copper Sulfate tended to make darker colors and splotchy results on the fabrics. Raw silk was able to absorb the dyes more so than the cotton. Not all dyes produced the colors expected which is dependent on the dye process. Two garments were created with naturally dyed cottons. The garments showcase the silhouette inspired by Korean costume Hanbok, and construction techniques of traditional patchwork Jogakbo.

Conclusion/Implications

The designers found that less harmful chemicals could be used in producing fabrics in the fashion industry. Natural dyes are an environmentally friendly source for dyeing fabrics. Various colors and intensity can be achieved by types of mordant used or depending on the fiber content.

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HEALTH CONDITIONS AND HOME MODIFICATIONS FOR LOW-INCOME ELDERLY HOMEOWNERS

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Purpose and Rationale: The homeownership rate in the U.S. for those 65 and older was almost 80% (Joint Center for Housing Studies of Harvard University, 2010). Also 80% of seniors have at least one chronic health condition, and 50% have at least two (Center for Disease Control and Prevention, 2009). As homeowners age, their quality of life is a concern because their homes may not be built to accommodate their physical challenges. Declines in health conditions of elderly homeowners, particularly those with limited resources, can negatively impact their ability to age in place. This study aims to understand the interaction of low-income elderly homeowners' health conditions, housing needs, and home modifications.

Methodology: Between June 2013 and May 2014, personal interviews with 30 low-income elderly homeowners in a central NC city, who completed home modifications, were conducted using open and closed ended questions. Responses were tape recorded and transcribed for content analysis.

Findings: Most participants (average age =73 years old) were single (28) and female (29). The majority heavily depended on government resources. Most lived in one-story, single detached housing (29) with two to three bedrooms (28). Thirty-nine (39) different health conditions were identified by the participants. The most frequently listed health conditions were diabetes (10), followed by high blood pressure (8) and knee problems/replacements (6). Fourteen reported that they were able to manage their activities of daily living (ADLs); some interviewees were limited enough in their ADLs that they required assistance from a caregiver (8) or a family member (5). Five listed falls as a risk to their health. Fifty home modifications were cited, including: grab bars (12), insulation (11), ramp/toilet (10), door (7), floor/plumbing/roof/sink (6), and lighting (5). Twenty-one participants mentioned a need for home improvements, including roof, windows, flooring, and/or grab bars.

Conclusions and Implications: Participants in this study were able to successfully remain in their homes following home modifications, despite their health issues. Thus, home modifications for low-income elderly homeowners having health concerns can imply a means to age in place. The impact of this study is to demonstrate the cost savings that older homeowners can experience by remaining in their homes and avoiding the costs associated with assisted living, nursing homes, or other long term care facilities. Aging in place through home modifications can also contribute to neighborhood stability and the economic growth of local communities.

References

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REFEREED ABSTRACTS - POSTER PRESENTATIONS
AGING IN PLACE: NEIGHBORHOOD & TOWN ENVIRONMENT FOR NC ELDERLY HOMEOWNERS WITH LIMITED RESOURCES

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Purpose and Rationale: The purpose of this study was to examine town and neighborhood environment for limited resource NC elderly homeowners pursuing aging in place. The physical, social or economic infrastructure of a community (town and neighborhood) could hinder or promote elderly homeowners’ aging in place (MetLife, 2013). In North Carolina, 68% of the population and over 80% of those aged 65 and older are homeowners (U.S. Census Bureau, 2012); and little research exists related to elderly homeowners with limited resources and their town and neighborhood environment.

Methodology: During April and May of 2015, 51 NC residents who were homeowners aged 55 and over, participated in ‘Aging in Place’ study with a face to face interview method with a structured questionnaire. The responses were coded and analyzed using the Statistical Package for the Social Sciences (SPSS) version 22 software. Descriptive statistics were employed to provide the profile of town and neighborhood environment of the sample.

Findings: Average age of homeowners was 72 years old, and 50 % reported their education level as high school graduate or less than high school. Almost 69% were African American and 28% were Caucasian. Almost 37% of respondents lived alone, and 77% of respondents were female. About 26% of the respondents reported being employed. Ninety-four percent reported having 2 or more bedrooms. Regarding their neighborhood and town environment, most of the residents were satisfied with their neighborhood and considered their neighbors to be friends. Also most of the respondents either trusted family or friends when making important decisions. Although the majority of the residents were satisfied with their neighborhood environment, they were least satisfied with the job opportunities, entertainment and living expenditures within their town environment.

Conclusions & Implications: Findings reveal that, for low income elderly homeowners, their relationships with neighbors, friends, and/or families within communities can be an important consideration when pursuing aging in their place. This study will benefit older adults, their families, their communities and policymakers, and lead to a number of policies and services that are developed to help older adults remain in their home and communities.

References

Acknowledgement. This abstract paper was drawn from a larger study investigating aging in place: what low income North Carolina elderly homeowners are doing to remain in their homes. “The project described was supported by Project Number, NC.X-273-5-13-170-1 from National Institute of Food and Agriculture. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the National Institute of Food and Agriculture.”

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Anti-obesity Effects of Onion Peels Ethanol Extract in 3T3-L1 and Primary Brown Adipocytes

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Obesity, which is characterized by excess body fat accumulation, causes various health problems including cardiovascular disease, diabetes, insulin resistance and osteoporosis. Inhibition of fat accumulation (lipogenesis and adipogenesis) and stimulation of energy expenditure (beta-oxidation) are typical scientific approaches to prevent obesity. Recent finding of metabolically active brown adipose tissue in human, which is responsible for a non-shivering thermogenesis to increase energy expenditure, has suggested a new way to prevent obesity. Although various functional foods have been attracted for improving obese condition, functional foods which have high efficiency to prevent obesity still remain to be discovered. Onion peel, a by-product of onion has shown possible benefits in obesity studies. The purpose of this study was to investigate the anti-obesity effect of onion peel in white and brown adipocytes which are related to energy storage and utilization, respectively. Briefly, 3T3-L1, fibroblasts that mimic white preadipocytes and primary brown preadipocytes isolated from interscapular brown adipose tissue of 4 week-old male C57BL/6 mice were cultured and differentiated into mature adipocytes. Cells during differentiation were treated with various concentrations of onion peel extracts (OPE) obtained through 60% ethanol extraction. The expression of genes encoding enzymes involved in lipogenesis, adipogenesis, beta-oxidation and thermogenesis were then measured using real-time PCR. One-Way ANOVA (p < 0.05) with Tukey’s post hoc test were conducted to perform statistical analysis using Graphpad prism. In 3T3-L1 cells, OPE decreased the expression of proliferator-activated receptor γ (PPARγ), fatty acid synthase, and acetyl-CoA carboxylase genes which are involved in adipogenesis and lipogenesis. Interestingly, OPE increased the gene expression of carnitine palmitoyltransferase 1 α and PPARγ coactivator 1 α which are related to the regulation of fatty acid oxidation. In brown adipocytes, OPE significantly increased the gene expression of uncoupling protein 1 which is associated with a non-shivering thermogenesis by utilizing fatty acids. In summary, OPE showed anti-obesity effects in both white and brown adipocytes by inhibiting adipogenesis and lipogenesis and increasing lipolysis. Onion peel may be a useful by-product of foods to reduce prevalence of obesity.

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Applying Bloom’s Taxonomy to a Nutrition and Gardening Education Undergraduate Course

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Purpose and Rationale: National trends related to childhood obesity have generated much discussion relative to the development of various programs and initiatives that impacted the expanding obesity epidemic, including more than 35 initiatives in North Carolina. While many programs are promising and linked to the benefits of healthy eating and increased activity in young children, little effort has been engaged in generating new knowledge for early childhood professionals who will care for and educate young children. The purpose of this study was to assess the components of a 3-hour interdisciplinary undergraduate course centered on nutrition, horticulture and child development. The course is entitled Nutrition and Gardening Education for Young Children and was developed and delivered by a collaborative team of educators and researchers. The aim of the course was to provide undergraduate students with the knowledge to work with young children and families in meeting their quality nutritional and agricultural needs. Bloom’s Taxonomy Model (2001) was identified as a classification tool to categorize the experiential learning activities of the course. The multi-tiered model classifies thinking in six cognitive levels of complexity (remembering, understanding, applying, analyzing, evaluating, and creating).

Methodology: The sample includes four cohorts of undergraduate students (N = 45) from majors including psychology, child development, natural resources, food and nutritional sciences, and sociology. The course was team taught by a research team who represented a variety of disciplines including: early childhood education, nutrition, horticulture, nursing, and cooperative extension. The diversity of instruction supported the multiple ways of students’ learning and application of the course goals and learning outcomes. Applying Bloom’s Taxonomy, higher order thinking skills of students were measured from lower level assessments such as pre/post-tests, quizzes, and class presentations to higher level assessments such as constructing an edible garden, preparing parent-child cooking demonstrations, and presenting at professional conferences. Furthermore, students participated in a “train-the-trainer” model where they gained knowledge, skills, and resources in physical activity and healthy eating curricula for young children. From such varied experiences these same students trained other students as well as early childcare professionals.

Findings: This course applied Bloom’s Taxonomy as a classification tool to organize students’ hierarchical level of thinking from concrete to abstract. For example, students’ reflective papers and final presentations demonstrated an increase in knowledge gained across in the three topic areas of nutrition, child development and horticulture. Qualitative reporting from parents, students and early childcare professionals reported the course as a value-added experience regarding drinking water, eating more and varied fruits and vegetables, and increasing physical activity.

Conclusions & Implications: The hierarchical nature of Bloom’s Taxonomy demonstrated that in order for students to apply knowledge and concepts of nutrition, child development and horticulture, they must first remember, recall and understand how the three knowledge bases and concepts are interrelated. This course fits into the current trend of health and nutrition and provides students with new skills to help young children and families become healthier and exercise. Thus, this interdisciplinary course promotes valuable knowledge and insights to health care providers, early educators, cooperative extension professionals, and researchers.

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Date palm (*Phoenix dactylifera* L.) as a primary constituent in developing a medium for cultivation of lactic acid bacteria

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**Purpose and rationale:** Lactic acid bacteria (LAB) have several applications in food industry. The standard medium DeMan Rogosa Sharp (MRS) to grow LAB is expensive and the industry is always looking for an alternative low cost medium. There are several agricultural by-products that can be utilized to develop medium for the growth of LAB. Date fruit industry produces large amount of unwanted by-products. Therefore, the objective of this study was to develop date palm based medium for the cultivation of lactic acid bacteria (LAB) using date by-products.

**Methodology:** The date palm extract (DPE) was mixed with deionized distilled water (DDW) at ratio 1:2 (w/v), centrifuged (4696 x g for 25 min) at 4°C, and then supernatant was autoclaved. The DPE was mixed with buffer solution to form a date palm medium (DPM). DPM was then mixed with different concentrations of sterile phytone peptone solution (PP) (0, 0.2, 0.4, 0.6, and 0.8 %, w/v). Lactobacilli MRS was used as a standard growth medium. Three *Lactobacillus reuteri* (DSM 20016, CF2-7F, and SD 2112) strains were individually inoculated into batches of MRS, and DPMs at ~ 2.5 log CFU/ml. Inoculated media were then incubated at 37°C for 18 h. Bacterial populations were determined at the end of the incubation. The experiments were conducted three times. The data obtained were analyzed by one way ANOVA. The means were compared with Duncan multi-comparison test at the p < 0.05 level.

**Findings:** Our results showed that in DPM (control), bacterial population reached to 3.18±0.5 log CFU/mL. Addition of low concentration of phytone peptone did not support the bacterial growth. However, when DPM medium was supplemented with 0.8% of phytone peptone, bacterial populations reached to 6.94 ± 0.1 log CFU/mL which was similar to the population found in standard MRS medium (7.90± 0.24 log CFU/mL). These results showed that there was no significant (P > 0.05) difference in the growth of LAB in MRS and developed DPM medium.

**Conclusions and Implications:** Our findings suggest that date by-products could be used as an alternative low cost medium to develop a growth medium for LAB.

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Development of a novel antibacterial nanocomposite film for food packaging

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There is an increasing public concern regarding the environmental pollution caused by excessive waste from packaging materials. Sweet potato starch (SPS) is a low cost and abundant biodegradable polymer that may be used for packaging. However, starch films are often limited by their poor mechanical properties. Incorporation of some additives may improve its mechanical properties. Biopolymer-clay nanocomposites are new classes of packaging systems with potentially improved mechanical properties. These nanocomposites are prepared by addition of low amounts of nano clay to the biopolymer matrix. Montmorillonite (MMT) nanoclay is the most commonly used one and has been successfully applied in numerous nanocomposite systems.

On the other hand, green leafy vegetables such as baby spinach leaves have been associated with a number of outbreaks due to foodborne pathogens in the last two decades. Nanocomposite films are excellent vehicle for a range of functional ingredients such as antibacterial agents. This property expands their applications into active packaging and may improve food safety by reducing the growth of pathogenic bacteria and increase the shelf life the food product. Essential oils are one of the natural antimicrobial compounds that are commonly used in biodegradable packaging, due to their potent antimicrobial properties. Thyme essential oil (TEO) has been evaluated and effectively exhibited antimicrobial activity against pathogenic microorganisms.

In this study an antibacterial nanocomposite film based on SPS and selective concentrations of TEO (0, 2, 4, and 6% v/v) was prepared. The main objectives of this study were to: 1) Evaluate the antibacterial activities of these films against Salmonella Typhimurium (S. Typhi) and Escherichia coli (E. coli) and 2) Investigate the antibacterial activity of the films on inoculated baby spinach leaves. The agar diffusion assay was used to determine the antibacterial activity of the nanocomposites.

The results showed that the incorporation of TEO significantly (P<0.05) increased the antibacterial activities of the films against E. coli and S. Typhi. The antibacterial activity of these films increased as the concentration of TEO increased. The greatest inhibitory effect against S. Typhi and E. coli was noted when nanocomposite films were activated with 6% v/v of TEO. In the next step, baby spinach leaves were inoculated with E. coli and S. Typhi and packed in nanocomposite film. The results showed that the population of E. coli and S. Typhi were effectively reduced on fresh baby spinach leaves.

These results suggest that TEO has the potential to be directly incorporated into SPS film to prepare antibacterial biodegradable films for various food packaging applications.

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Obesity is characterized by excessive deposition of body fat especially in adipose tissues, which is related to increased risk of developing various chronic diseases. Prevalence of obesity has been growing in the USA over the past decades, requiring efficient ways for its prevention. The human body has two types of adipose tissues, white adipose tissue (WAT) and brown adipose tissue (BAT). WAT stores excess calories as fat which makes people obese. BAT utilizes stored and circulating fat by a non-shivering thermogenesis promoted by uncoupling protein (UCP) 1, which is a critical protein to generate heat in BAT. With the evidence of metabolically active BAT in the human body, activation of BAT may be a potential way to prevent obesity by increasing energy expenditure. Beetroot (*Beta vulgaris*) is a root vegetable commonly found in grocery markets and consumed by most people worldwide. Beetroot has demonstrated various health benefits, especially with betaine, a main active compound in beetroot. However, the anti-obesity effect of beetroot remains unclear. The aim of this study was to examine the effect of beetroot extract and betaine on UCP1 gene expression using primary brown adipocytes. Briefly, brown preadipocytes were isolated from interscapular BAT of 4 week-old male C57BL/6 mice and then cultured for propagation during 5-6 days. When brown preadipocytes were ready for experiments, the cells were seeded and counted as day 1, then differentiated using induction cocktail, which becomes mature brown adipocytes on day 11, as indicated as a control group. In experimental groups, beetroot extract (200 µg/ml) or betaine (2.5 mM) were added to brown adipocytes on day 9 and incubated for next two days. At the end of culture (day 11), cells were harvested for total RNA isolation to synthesize cDNA, which was then amplified to determine the expression of UCP1 gene using a real-time PCR. Along with UCP1 expression, lipid droplets in brown adipocytes were observed with Oil-Red O staining and cell images were obtained under a microscope. Statistical analysis was performed using a student t-test. Results showed that UCP1 gene was increased in brown adipocytes treated with beetroot extract whereas it was not changed by betaine treatment. Consistent with increased UCP1 gene, beetroot treatment decreased lipid droplets in brown adipocytes compared to the control group, but no change in brown adipocytes treated with betaine. The data suggests that active components in beetroot may increase energy expenditure by utilizing fat through a non-shivering thermogenesis in BAT, resulting in a reduction of WAT. However, betaine may not be the main compound to increase UCP1 gene expression. In conclusion, beetroot may be a promising vegetable to reduce the prevalence of obesity through a non-shivering thermogenesis.
Effect of Turmeric in Fatty Liver of High Fat Diet-Induced Obese Mice

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The prevalence of obesity has increased every year in the United States. Obesity mainly results from energy imbalance which causes excess accumulation of fat in body. This event occurs not only in white adipose tissue but also other tissues, such as liver, muscle, and heart. Liver is a main organ to metabolize macronutrients including carbohydrate, lipid and protein. Diet-induced obesity causes excessive accumulation of intrahepatic triglycerides, which develops a non-alcoholic fatty liver disease. Long term fatty liver condition leads to metabolic complications that affect the entire body condition. Some functional foods have shown potential to reduce development of diet-induced fatty liver. Turmeric (Curcuma longa), the major ingredient of many Indian foods, has been known for various health benefits including anti-obesity. These benefits are attributed to curcumin which is the typical functional compound of turmeric. However the effect of turmeric on reducing fatty liver is still unclear. Therefore, the aim of this study was to examine the effect of turmeric on fatty liver using high fat diet-induced obese mice.

Briefly, Four week-old male C57BL/6 mice were fed either a high fat diet or a high fat diet supplemented with 0.5% turmeric extract for 8 weeks. Body weight and food consumption were measured weekly. On the completion of a feeding study, mice were euthanized and then liver tissues were dissected. Total RNA was isolated from homogenized liver tissue, followed by cDNA synthesis. Real-time polymerase chain reaction analysis was used to determine the expression of fatty acid synthesis (FAS), acetyl-CoA carboxylase (ACC), and carnitine palmitoyltransferase I α (CPT1α) genes related to fatty acid synthesis and fatty acid oxidation respectively. As a result, FAS and ACC genes had 63.3% and 51.4% decrease in livers of mice fed a diet supplemented with turmeric extract compared to the control, respectively. Interestingly, the expression of CPT1α gene was also decreased by 24.6% compared to the control. However, the effect of turmeric on the inhibition of fatty acid synthesis in liver was much higher than the reduction of fatty acid oxidation by turmeric supplementation. In summary, our study showed the evidence that turmeric can inhibit the accumulation of fat in liver. Further studies on turmeric are warranted to investigate underlying mechanisms.

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Effects of hydrocolloids on acid whey production of nonfat Greek yogurt

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Purpose and Rationale: Greek yogurt has become very popular in the U.S. markets and now accounts for more than a third of total yogurt sales. The growing popularity of Greek yogurt has resulted in a concomitant increase in production of an unwanted byproduct known as acid whey. In our current research, we are investigating the effects of food ingredients such as hydrocolloids on acid whey production of Greek yogurt.

Methodology: Non fat milk was supplemented with gums and proteins. Gum Arabic, Inulin, and Pectin at 0.01, and 0.05 % (w/v), and whey protein concentrate (WPC) and whey protein isolate (WPI) at 0.5 and 1.0% (w/v) were mixed in milk slowly at 50°C with agitation. Milk without supplementation served as a control sample. The yogurt mixes were heated at 90°C for 10 min, inoculated with 3.0% of starter culture, and incubated at 40°C for 4 h (pH 4.6), then refrigerated overnight at 4°C. Next day, each sample was centrifuged (1300 g, 10 min) and acid whey production was measured by calculating water holding capacity (WHC). Data obtained were subjected to analysis of variance using completely randomized design. Tukey test was used for the determination of statistically different groups.

Findings: Our results showed that fortification of gum pectin and whey proteins significantly (P < 0.001) reduced the acid whey production compared to the control sample. The higher WHC was 39.71 ± 0.51, 50.23 ± 0.23, and 48.86 ± 0.24% in yogurts with pectin 0.05 %, WPC 1.0%, and WPI 1.0%, respectively compared with the control (34.95 ± 0.97%).

Conclusions and Implications: Our results demonstrated that hydrocolloids can reduce the acid whey and could be industrially applicable for the production of Greek yogurt. In addition to these hydrocolloids, we are also optimizing other factors such as temperature, fat, and type of starter culture that could help reduce the acid whey production in Greek yogurt.

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Effects of Particle Size of Grape Pomace on its Application in Food-Cookie Model
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**Rational:** Grape pomace (GP) has great potential to serve as a cheap source of antioxidant rich dietary fiber to improve the nutritional value of food products, and baked goods are good vehicles to deliver the health benefits of GP to consumers. Particle size reduction of grains and dietary fiber rich materials by grinding is usually demanded for better acceptance of the final products. The objective of this study is to investigate the degree of grinding/particle size of GP on the sensory quality of food product containing GP.

**Methodology:** A sugar cookie model was used to evaluate the impacts of PG particle size on the physical properties of cookies. Same amount of GP at different particle size were mixed with other ingredients to form cookie doughs which were flatten and cut with cookie cutter. The cookies were then baked at 350°F for 20 minutes. After cooling to room temperature, cookie density, surface smoothness, texture (fracturability, hardness and springiness) and color (L, a and b values) were used as indicators to evaluate the effects of GP particle size and dose on the physical properties of cookies. The cookie without GP was used as control.

**Results:** At same GP level, reducing particle size resulted in smoother and softer but darker cookies. The hardness decreased, but fracturability and springiness increased as particle size decreasing. The whiteness (L-value) decreased, while redness (a-value) increased with particle size reduction. In addition, the diameter of cookie decreased but the thickness increased as GP particle size decreased. These findings indicate that the particle size of GP affected the texture, color and geometric properties. More experiments are undergoing to evaluate nutritional properties, sensory quality and shelf life stability of cookies containing GP powders of different particle size.

**Conclusion:** The findings of the study indicates that the particle size of GP has great impact on the quality of food products containing GP. These findings may provide guidelines to the value added utilization of grape pomace by food manufactures or general consumers.

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Growth inhibition of three spoilage fungi by novel antifungal peptides produced by
_Lactobacillus plantarum TE10_

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Purpose and Rationale: Novel antifungal peptides produced by _Lactobacillus plantarum_ TE10 have been recently reported. These peptides are considered as natural antimicrobials and could be used as natural preservatives in food products. However little is known regarding the effectiveness of these peptides against common fungi (Aspergillus flavus MD3, Penicillium roqueforti MD4, and Eurotium rubrum MD5) that caused food spoilage. Therefore the objectives of this study were to: 1. Screen _Lactobacillus plantarum_ TE10 peptides against spoilage fungi, 2. Examine the morphological damages of the fungi mycelia by these peptides; and 3. Characterize the structure of the peptides that are determined to be effective against these fungi.

Methodology: _Lactobacillus plantarum_ TE10 was grown in MRS agar supplemented with 2% casein at 37°C for 36 h. The potential antifungal peptides were then fractionated using gel filtration Sephadex G25 and a standard biological assay was followed to determine the antifungal activity. The peptides fractionation was carried out by using RP-HPLC and identified by using LC/MS-MS. The fractions were cultivated with the fungi to observe the morphological changes, and then the potential antifungal peptides synthesized and tested against the fungi.

Findings: Our results indicated that fraction 14 of the gel filtration Sephadex G25 had antifungal activity against the tested fungi. This fraction caused damage at the tip of the mycelia of the tested spoilage fungi, and leakage of the cytoplasmic materials out of the cells as observed by scanning electron microscope. Three peptides identified from this fraction demonstrated significant inhibition against the tested fungi at concentrations of 5 mg/ml. These peptides were identified as novel with no match found in the peptide database. This research is the first step to identify new natural preservatives and the initial trail to understand the mode of action and the morphological damage caused to the fungi.

Conclusions and Implications: Our results revealed the potential of using _Lactobacillus plantarum_ TE10 as a source for natural antifungal agents for different application in food preservation. The novel peptides identified in this study could be used as natural food preservatives and health promoting agents.

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Impact of aspirin on growth and functionality of *Lactobacillus rhamnosus* (ATCC 53103) after 12 weeks of exposure using natural selection

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**Purpose and Rationale:** Probiotics have demonstrated efficacy in preventing and treating various medical conditions, particularly those involving the gastrointestinal tract however, regular intake of medical drugs such as aspirin could have various effects on survival and functionality of gut microflora. The present study was undertaken to determine long term exposure effects of aspirin on growth and functionality of *Lactobacillus rhamnosus* (ATCC 53103).

**Methodology:** Active strain of *L. rhamnosus* (ATCC 53103) was harvested and washed with sterilized 0.1% peptone water. Cells were then transferred into aliquots of 9 mL MRS broth containing approximately 6 mg/mL aspirin, vigorously mixed and incubated at 37°C with constant shaking for 4 h. Then cells were harvested and transferred into fresh MRS broth (12-16 h) until optical density readings reached to 0.7-0.9. The exposure protocol was repeated for five sequential transfers within the week from MRS broth to selection medium and then plated onto MRS agar containing same concentration of aspirin and incubated at 37°C for 48h. One isolated colony was transferred from aspirin containing agar plate into a fresh MRS broth and incubated until optical density of 0.7-0.9 was reached. The sequential transfer was repeated for 12 consecutive weeks. After 12 weeks of exposure to aspirin, bacterial populations, β-galactosidase activity, and protein expression were determined. Strain without aspirin exposure was used as control. Data obtained were subjected to analysis of variance using completely randomized design. Analysis of variance (ANOVA) was used for the determination of statistical different within groups.

**Findings:** Our results demonstrated that *L. rhamnosus* could survive after a long term exposure to aspirin. The average β-gal activity of *L. rhamnosus* strain in control was 153 ± 2.5 Gal U., however, the production of β-gal activity was completely inhibited in exposed strain. Protein concentration showed about 54% improvement after long term exposure and the SDS-page gel indicated synthesis of more protein in the exposed strain.

**Conclusions and Implications:** Regular intake of medical drugs could affect the beneficial gut microflora. It is concluded that bacteria could adapt to a changing environments through inherent of natural selection losing some functionality. To maintain the healthy gut ecosystem, it is important to consume foods containing probiotics and other functional foods.

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New method of shrimp coating to preserve its quality during storage time

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Shrimp is the most popular seafood in the U.S. However, shrimp has a limited shelf life due to microbiological spoilage and postmortem changes which may affect on the quality of shrimp. Currently food industry relies on different types of preservation methods such as chemical preservatives, heat processing, modified atmosphere packaging, vacuum packaging or refrigeration. Unfortunately, these methods do not prevent food spoilage entirely. Therefore, food industry is looking for new ways to preserve the food by using natural ingredients. One of these methods that include the natural ingredient is edible coating. Edible coating is an environmentally friendly technology that may help to preserve the quality of shrimp during the storage time.

In this study, the effect of an edible coating containing sweet potato starch (SPS) and variable concentrations of thyme essential oil (TEO) at 0, 2, 4 and 6% v/v on the quality of the shrimp was investigated. Coated shrimp samples were evaluated during 8 days of refrigerated storage for textural and color properties, lipid oxidation, pH, bacterial count, melanosis, and sensory scores. Texture properties of coated shrimp were determined by Kramer shear and texture profile analysis. Color values were measured with L*a*b*. For sensory evaluation, panelists assessed the shrimp samples for appearance, odor, and texture.

Three treatment samples received higher sensory scores than the control samples. However, no differences in odor were found in all shrimp samples. Textural properties of coated shrimp were generally more acceptable compared to the control. SPS-based edible coatings (SPSC) application resulted in lower pH ($P < 0.05$) as compared with the uncoated control. SPSC resulted in lower total plate count of bacteria with TEO ($P < 0.05$) toward the end of storage. Antioxidant activity of SPSC was only apparent during the earlier periods of storage, while TEO reduced lipid oxidation as measured by thiobarbituric acid value. SPSC application with TEO generally resulted in higher lightness ($L^*$), yellowness ($b^*$) and lower redness ($a^*$) values. These results suggest that edible coating can be used to improve the shrimp quality during the refrigeration storage. The beneficial of the result may be a viable solution for the food industry.

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Quality of Life Indicators of an Aging Population
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As more people are living longer in the United States and throughout the world, a growing concern is how to help aging individuals maintain independent, high-functioning, healthy, high-quality lives. As a larger proportion of the world’s population is falling in this sector, with almost one in five of the United States’ population being over 65 (Ortman, Velkoff, and Hogan, 2014), it becomes increasingly important to understand the factors that enable people to sustain a high quality of life as they age. The purpose of this study was to explore the question: How can we enable an ever-increasingly older population to continue to live healthy, high quality, independent lives?

A review of literature was conducted to determine traits that accompany high quality of life throughout the lifespan as evidenced from previous research. In order to add to existing research, five in-depth interviews were conducted with five healthy adults over the age of 85 using a qualitative approach to determine common themes of successful aging. Indicators often used to measure quality of life include the individual’s physical and mental health status, the environmental and social supports in place for that person, their general outlook on life, and their perceived human value and sense of purpose in life. These same criteria were used in selecting participants for the study. Findings from the new study were compared with themes from existing literature to determine traits that predicted resiliency in the decline of other quality of life indicators.

Studies (Buettner, 2012; Heumann, McCall, and Boldy, 2001; Naz, Naz, and Gul, 2014; Barlow, Liu, and Wrosch, 2015) suggest indicators that predict high quality of life include coping mechanisms, social support and engagement, and perceptions of well-being. These factors may serve a protective function and indicate an overall high quality of life, even where there is the presence of other negative quality of life indicators.

These indicators may prove useful in addressing social supports and services as a means of enabling and empowering this growing portion of the population.

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Excessive energy intake is stored in adipose tissue as fat. However, overloaded fat in adipose tissue causes various chronic diseases including metabolic syndrome and type 2 diabetes. Therefore, increasing the capacity of adipose tissue for storing fat would be a critical strategy to treat type 2 diabetes. Peroxisome proliferator-activated receptor gamma (PPARγ), a highly expressed nuclear receptor found in adipocytes, plays an important role in adipogenesis so the capacity of adipose tissue can increase. In practice, thiazolidinediones, a class of drugs used to treat diabetes, behave as ligands that stimulate the expression of PPARγ. However, use of thiazolidinediones presents adverse side effects, such as weight gain and liver damage. Therefore, many functional foods have gained attraction as an alternative remedy of diabetes. Cinnamon (cinnamomum cassia), a spice that is derived from the bark of cinnamon trees, has been used extensively as a traditional herb to manage numerous health conditions. In this study our aim was to investigate the anti-diabetic effects of cinnamon extract in 3T3-L1 adipocytes. Briefly, 3T3-L1, a mouse embryonic fibroblast cell line that mimics preadipocytes, was cultured and differentiated into mature white adipocytes for 11 days. To determine the effect of cinnamon extract (CE) on PPARγ, preadipocytes were treated once with various concentrations of CE at 50, 100, and 200 μg/ml on day 3, when differentiation of the cells was initiated with an adipogenic cocktail. On day 11, total RNA was extracted from the cells and used to synthesize cDNA, a template for polymerase chain reaction (PCR). Real-time PCR was used to quantify the expression of PPARγ, fatty acid synthase (FAS) which are related to the regulation of adipogenesis and lipogenesis. To determine the lipid accumulation by CE treatment in mature white adipocytes, lipid droplets in the cells were stained with Oil-Red O. Statistical analysis was performed using One-way ANOVA with Tukey’s post-hoc test. Cells treated with 100 and 200 μg/ml of CE exhibited increased expression of PPARγ and FAS genes, which increased the capacity of lipid deposition in adipocytes. In the Oil Red O staining, there was an observed accumulation of lipid droplets in cells treated with CE. The results suggest that CE may have potential anti-diabetic effects as a PPARγ agonist.

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Impact of Grape Pomace Addition on Vitamin Retention in Food Product During Extrusion Cooking

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Rational of the study: Extrusion cooking is a multi-functional and short-time thermal process. This food processing technology has many beneficial effects including the ability to destroy antinutritional factors and microorganisms while increasing the digestibility of protein and starch. However, it also caused some undesirable effects such as significant loss of some vitamins. Grape pomace (GP) is a fiber and polyphenol antioxidant rich by-product of grapes after wine making. The addition of GP in extruded product has potential to increase antioxidant potential and dietary fiber content of the products and reduce vitamin loss due to oxidative degradation at high temperature. The objective of this study was to investigate the impacts of GP on vitamin retention of extruded corn product during extrusion cooking.

Methodology: A 4x3 two-factor factorial design was used for extrusion experiments. Yellow corn-grits was mixed with four fat soluble vitamins (vitamin A acetate, vitamin D3, vitamin E and vitamin E acetate), each 200 ppm. Different amount of ground grape (0, 5, 10 and 15%, w/w) and water (15, 17 and 19%, w/w) the mixture were extruded under same extrusion temperature (160ºC) and screw speed (175 rpm). At each moisture level, the product with 0% GP was served as control. The products were evaluated for vitamin retention. The individual vitamin content in each product after extrusion was determined by HPLC method.

Results: GP exhibited great protection on vitamin A acetate, vitamin D3 and Vitamin E acetate during extrusion cooking of corn-based products. The retention of these added vitamins varied with GP content in the formula. The highest vitamin retention was observed at 10% GP. At 15% GP, vitamin retention decreased significantly. Products containing 5% and 10% GP had higher contents of vitamin A acetate, vitamin D3 and Vitamin E acetate than sample containing 0.02% BHA/BHT (P<0.05). However, GP did not show protective effect on vitamin E.

Conclusion: The findings suggest that grape pomace has potential to be used as an inexpensive source of antioxidant to inhibit the oxidation and reduce vitamin loss of product during extrusion cooking, but the level of GP added to the formula has to be controlled to prevent the prooxidant activity of the GP polyphenols.

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HBCU STUDENTS’ FAMILIARITY WITH FCS-BOK: FOCUSING ON WELL-BEING AND HEALTH MATTERS

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Purpose and Rationale: This research assessed HBCU students’ familiarity with well-being and health perspectives in the FCS-BOK (Family and Consumer Sciences Body of Knowledge). In the FCS-BOK, individuals, families, and communities are considered important elements when understanding well-being and health of our society (Nickols et al., 2009). For college students in FCS areas, it is vital to understand the elements.

Methodology: During fall semester 2014, a one-page survey was administered to 191 students enrolled in four FCS core courses. Five demographic questions and four statements on well-being and/or health were included in the survey. Participants rated their familiarity with each statement using a five-point Likert-type scale (1=not at all familiar and 5=extremely familiar). Descriptive statistics were used for the sample profile, and one-way ANOVA was used to determine mean differences in students’ familiarity with health and well-being by classifications and majors.

Findings: Forty-two percent (42%) of students were upper level classification and 84% were in an FCS major: 39% in Child Development and Family Studies, 25% in Fashion Merchandising and Design, 15% in Food and Nutritional Sciences, and 4% in Consumer Sciences. Most participants were female (92%). The highest mean score was found in “Wellness encompasses health, well-being, adequate nutrition, and food security” (M=4.10). Students’ classification levels were significantly associated with community vitality, “Community vitality provides an environment conductive to individual and family well-being” [F(3, 187)=6.4, p=.0]; Life course development, “Life course development focuses on the well-being of individuals, families, consumers, and the communities” [F(3, 187)=6.5, p=.0]; Wellness [F(3, 187)=6.4, p=.0]. Students’ major was only associated with Community vitality [F(3, 187)=3.2, p=.0].

Conclusions and Implications: This study is meaningful in assessing HBCU students’ familiarity with the FCS-BOK health and well-being elements. The fact that neither classification nor major was significantly associated with individual well-being suggests an area for future course development. An ability to apply these components will help FCS graduates holistically disseminate research-based information.

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Emerging Adult College Students: Self-reflection on Spending Habits and Money Management

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Purpose and rationale

Financial literacy establishes a foundation for future financial success and later happiness in life. However, little research exists on effective approaches to help emerging adults gain/improve financial literacy. The purpose of this study was to examine emerging adults’ (particularly, college students) knowledge of their finances and money management habits, and explore whether a reflective budget tracking assignment could be a useful tool for raising financial awareness and teaching emerging adults basic money management skills.

Methodology

Participants were college students enrolled in two sections of a family consumer course \(n = 114\). In completing an Individual Budget Assignment, students (a) recorded their current spending habits for a month, (b) identified their spending leaks (c) assessed what they learned by tracking their expenses, and (d) described strategies they would take to increase their net cash-flow in the near future.

A phenomenological approach was utilized to analyze students’ responses to budget tracking assignment. The phenomenological approach is a reduction process of grouping emergent themes of responses \(Wolff, 1999\). Three authors individually reviewed the responses multiple times to understand the students’ experience with the assignment, in order to discern potential themes.

Findings

Results showed that most students were not aware of their spending habits. Many of the students had never tracked their expenses or completed an assignment such as this. Emergent themes were 1) surprise over total cash outflow, 2) cash outflow exceeded income, and 3) recognition of spending behaviors impact on financial future. These themes were further illustrated by students sharing the consequences to themselves and others because of poor money management behaviors. Not all students expressed motivation to change their financial behavior but most indicated a desire to change some aspect of their financial spending habits in order to save more for their future financial goals. Many realized that their current spending habits could be detrimental to their future goals and plans.

Conclusions and Implications for research and/or practice

The outcome of this study indicates there is value in having emerging adults track their spending habits. College students who are confronted with the reality of how they spend their money through an assignment like this raises their awareness of the potential consequences of poor financial management behaviors. This experience also allowed college students a chance for reflection and goal setting to impact a positive change in their financial behaviors to potentially improve their financial future.

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