



---

## Bibliography

- Abbasi, K., Beigrezai, S., Ghiasvand, R., Pourmasoumi, M., & Mahaki, B. (2019). Dietary patterns and attention deficit hyperactivity disorder among Iranian children: a case-control study. *Journal of the American College of Nutrition*, 38(1), 76-83.
- Abd El Baaki, O. M., Abd El Hamid, E. R., Zaki, S. T., Alwakkad, A. S. E. D., Sabry, R. N., & Elsheikh, E. M. (2021). Diet modification impact on ADHD outcome. *Bulletin of the National Research Centre*, 45(1), 1-8.
- Abd El Hamid, E. R., Abdel-Shaheed, A. A., Sabry, R. N., Youness, E. R., Shady, M. M. A., Megawer, A. S., & Mohamed, N. A. (2015). Serum levels of monocyte chemoattractant protein-1, interleukin-6, and paraoxonase-1 in childhood obesity. *Journal of The Arab Society for Medical Research*, 10(1), 27.
- Abeywickrama, H. M., Koyama, Y., Uchiyama, M., Shimizu, U., Iwasa, Y., Yamada, E., & Mitobe, Y. (2018). Micronutrient status in Sri Lanka: a review. *Nutrients*, 10(11), 1583.
- Ahmad, T., Amjad, M., Batool, A., Saeed, N., & Adnan, M. A. J. (2016). IMPACT ASSESSMENT OF NUTRITIONAL EDUCATION ON HEALTH AND SCHOOLING OF PRIMARY CLASS STUDENTS. *Health*, 1(1.35), 1-47.
- Al Khawli, F., Pateiro, M., Domínguez, R., Lorenzo, J. M., Gullón, P., Kousoulaki, K., ... & Barba, F. J. (2019). Innovative green technologies of intensification for valorization of seafood and their by-products. *Marine Drugs*, 17(12), 689.
- Al-Alawi, R. A., Al-Mashiqri, J. H., Al-Nadabi, J. S., Al-Shihi, B. I., & Baqi, Y. (2017). Date palm tree (*Phoenix dactylifera* L.): natural products and therapeutic options. *Frontiers in plant science*, 8, 845.
- Al-Balushi, N., Al-Alawi, M., Al Shekaili, M., Al-Balushi, M., Mirza, H., Al-Huseini, S., ... & Al-Adawi, S. (2019). Predictors of burden of care among caregivers of drug-naive children and adolescents with ADHD: A cross-sectional correlative study from Muscat, Oman. *Journal of attention disorders*, 23(5), 517-526.
- Alem, C., Ennassir, J., Benlyas, M., Mbark, A. N., & Zegzouti, Y. F. (2017). Phytochemical compositions and antioxidant capacity of three date (*Phoenix dactylifera* L.) seeds varieties grown in the South East Morocco. *Journal of the Saudi Society of Agricultural Sciences*, 16(4), 350-357.
- Altomare, R., Damiano, G., Palumbo, V. D., Buscemi, S., Spinelli, G., Cacciabauda, F., ... & Monte, A. I. L. (2017). Feeding the brain: the importance of nutrients for brain functions and health. *Prog Nutr*, 19(3), 243-247.

- Altun, H., Sahin, N., Belge Kurutas, E., & Güngör, O. (2018). Homocysteine, pyridoxine, folate and vitamin B12 levels in children with attention deficit hyperactivity disorder. *Psychiatria Danubina*, 30(3), 310-316.
- Ambigaipalan, P., Oh, W. Y., & Shahidi, F. (2020). Epigallocatechin (EGC) esters as potential sources of antioxidants. *Food chemistry*, 309, 125609.
- American Association of Cereal Chemists. Approved Methods Committee. (2000). *Approved methods of the American association of cereal chemists* (Vol. 1). Amer Assn of Cereal Chemists.
- American Psychiatric Association (APA) (2013) Diagnostic and statistical manual of mental disorders (DSM-5). American Psychiatric Pub, Washington, DC
- American Public Health Association. 2015. Compendium of Methods for the Microbiological Examination of Foods, 5th edition. APHA, Washington, DC
- Anand, P., & Sachdeva, A. (2016). Effect of poly unsaturated fatty acids administration on children with attention deficit hyperactivity disorder: a randomized controlled trial. *Journal of Clinical and Diagnostic Research: JCDR*, 10(9), OC01.
- Anchari (2020). Attention deficit/hyperactivity disorder (ADHD) in children. Mayo Clinic. <https://www.mayoclinic.org/diseases-conditions/adhd/symptoms-causes/syc-20350889>.
- Ani, E. C., & Okoye, J. I. (2021). Nutrient Composition, Physical and Sensory Properties of Cookies Produced from Millet, African Walnut and Unripe Plantain Composite Flours. *J Food Sci Nutr*, 7(108), 2.
- Annelies, V., Harry, R., Ines, W., Annelies, B., Tess, D. B., & Nina, H. (2018). Evaluation of biomarkers of oxidative stress in attention-deficit/hyperactivity disorder (ADHD). *J. Mol. Biomark. Diagn*, 9(390), 10-4172.
- Anniza, S., Andriani, R., & Vinny, P. E. (2022). SPECIAL NEEDS CHILDREN NUTRITIONAL STATUS WITH GROSS MOTOR DELAY AGE 0-6 YEARS: AN OVERVIEW. *Indonesian Journal for Health Sciences*, 6(2), 24-35.
- Ansari, J. A. N., & Khan, N. A. (2020). Exploring the role of social media in collaborative learning the new domain of learning. *Smart Learning Environments*, 7(1), 1-16.
- AOAC (2019) Official Methods of Analysis of the Association of Official Analytical Chemists: Official Methods of Analysis of AOAC International. 21st Edition, AOAC, Washington DC.
- Assari, S., & Caldwell, C. H. (2019). Family income at birth and risk of attention deficit hyperactivity disorder at age 15: racial differences. *Children*, 6(1), 10.
- Association, American Psychiatric. (2013). *Diagnostic and statistical manual of mental disorders*. American Psychiatric Publishing.
- Aydin, G., Margerison, C., Worsley, A., & Booth, A. (2022). Parents' Communication with Teachers about Food and Nutrition Issues of Primary School Students. *Children*, 9(4), 510.

- Baker, B. H., Lugo-Candelas, C., Wu, H., Laue, H. E., Boivin, A., Gillet, V., ... & Baccarelli, A. A. (2020). Association of prenatal acetaminophen exposure measured in meconium with risk of attention-deficit/hyperactivity disorder mediated by frontoparietal network brain connectivity. *JAMA pediatrics*, *174*(11), 1073-1081.
- Ball, R., Duncanson, K., Ashton, L., Bailey, A., Burrows, T. L., Whiteford, G., ... & Collins, C. E. (2021). Engaging new parents in the development of a peer nutrition education model using participatory action research. *International Journal of Environmental Research and Public Health*, *19*(1), 102.
- Ball, R., Duncanson, K., Burrows, T., & Collins, C. (2017). Experiences of parent peer nutrition educators sharing child feeding and nutrition information. *Children*, *4*(9), 78.
- Balyan, J. K., Choudhary, R. S., Kumpawat, B. S., & Choudhary, R. (2016). Weed management in blackgram under rainfed conditions.
- Barbosa Neves, B., Franz, R., Judges, R., Beermann, C., & Baecker, R. (2019). Can digital technology enhance social connectedness among older adults? A feasibility study. *Journal of Applied Gerontology*, *38*(1), 49-72.
- Barbosa Neves, B., Franz, R., Judges, R., Beermann, C., & Baecker, R. (2019). Can digital technology enhance social connectedness among older adults? A feasibility study. *Journal of Applied Gerontology*, *38*(1), 49-72.
- Baroni, L., Goggi, S., Battaglino, R., Berveglieri, M., Fasan, I., Filippin, D., ... & Battino, M. A. (2018). Vegan nutrition for mothers and children: practical tools for healthcare providers. *Nutrients*, *11*(1), 5.
- Beauchamp, M. H., Tang, K., Yeates, K. O., Anderson, P., Brooks, B. L., Keightley, M., ... & Zemek, R. (2019). Predicting wellness after pediatric concussion. *Journal of the International Neuropsychological Society*, *25*(4), 375-389.
- Beck, A. T., Davis, D. D., & Freeman, A. (Eds.). (2015). *Cognitive therapy of personality disorders*. Guilford Publications.
- Becker, D. R., McClelland, M. M., Loprinzi, P., & Trost, S. G. (2014). Physical activity, self-regulation, and early academic achievement in preschool children. *Early Education & Development*, *25*(1), 56-70.
- Beela, G. K., & Raji, V. R. (2017). Impact of diet intervention on the attention deficit hyperactivity disorder (ADHD) symptomatology in school going children. *Journal of Psychology*, *8*(2), 77-82.
- Béné, C., Arthur, R., Norbury, H., Allison, E. H., Beveridge, M., Bush, S., ... & Williams, M. (2016). Contribution of fisheries and aquaculture to food security and poverty reduction: assessing the current evidence. *World Development*, *79*, 177-196.
- Bener, A. (2015). Higher prevalence of Iron deficiency as strong predictor of attention deficit hyperactivity disorder in children. *European Psychiatry*, *30*, 691.

- Berezowitz, C. K., Bontrager Yoder, A. B., & Schoeller, D. A. (2015). School gardens enhance academic performance and dietary outcomes in children. *Journal of School Health, 85*(8), 508-518.
- Bhardwaj, A., Mandot, S., & Jain, H. (2019). Prevalence of attention deficit hyperactivity disorder, gender difference and its co morbidity among urban school children in a city of southern Rajasthan, India.
- Bhati, D., & Raghuvanshi, R. S. (2020). Nutritional Quality Evaluation of Popular Indian Fried Snacks Based on Cowpea. *Int. J. Curr. Microbiol. App. Sci, 9*(9), 650-655.
- Bhuyan, D., Greene, G. W., & Das, R. K. (2019). Prospects and application of nanobiotechnology in food preservation: molecular perspectives. *Critical reviews in biotechnology, 39*(6), 759-778.
- Bonafini, S., Antoniazzi, F., Maffei, C., Minuz, P., & Fava, C. (2015). Beneficial effects of  $\omega$ -3 PUFA in children on cardiovascular risk factors during childhood and adolescence. *Prostaglandins & other lipid mediators, 120*, 72-79.
- Boots, S. B., Tiggemann, M., & Corsini, N. (2019). Pumpkin is “yucky”!: A prospective study of overt and covert restriction in the development of young children's food preferences. *Appetite, 135*, 54-60.
- Borge, T. C., Biele, G., Papadopoulou, E., Andersen, L. F., Jacka, F., Eggesbø, M., ... & Brantsæter, A. L. (2021). The associations between maternal and child diet quality and child ADHD—findings from a large Norwegian pregnancy cohort study. *BMC psychiatry, 21*(1), 1-14.
- Borsboom, D., Cramer, A. O., & Kalis, A. (2019). Brain disorders? Not really: Why network structures block reductionism in psychopathology research. *Behavioral and Brain Sciences, 42*, e2.
- Bostock, E. C., Kirkby, K. C., & Taylor, B. V. (2017). The current status of the ketogenic diet in psychiatry. *Frontiers in psychiatry, 8*, 43.
- Bowling, A., Davison, K., Haneuse, S., Beardslee, W., & Miller, D. P. (2017). ADHD medication, dietary patterns, physical activity, and BMI in children: a longitudinal analysis of the ECLS-K study. *Obesity, 25*(10), 1802-1808.
- Boxhoorn, S., Lopez, E., Schmidt, C., Schulze, D., Hänig, S., & Freitag, C. M. (2018). Attention profiles in autism spectrum disorder and subtypes of attention-deficit/hyperactivity disorder. *European Child & Adolescent Psychiatry, 27*, 1433-1447.
- Boyd, J. E., Ouellette, M. J., Puccinelli, C., & McCabe, R. E. (2021). Case Formulation, Behavior Analysis, and Diagnostic Interviews
- Brauner, P., Calero Valdez, A., Schroeder, U., & Ziefle, M. (2013). Increase physical fitness and create health awareness through exergames and gamification: The role of individual factors, motivation and acceptance. In *Human Factors in Computing and Informatics: First International Conference, SouthCHI 2013, Maribor, Slovenia, July 1-3, 2013. Proceedings* (pp. 349-362). Springer Berlin Heidelberg.

- Brotas, M. S., Carvalho, G. A., & Pereira, P. A. (2020). Determination, through derivatization and GC-MS analysis, of omega-3 and omega-6 fatty acids in fish oil capsules sold in Salvador, Bahia. *Journal of the Brazilian Chemical Society*, *31*, 447-455.
- Brzęk, A., Strauss, M., Przybyłek, B., Dworak, T., Dworak, B., & Leischik, R. (2018). How does the activity level of the parents influence their children's activity? The contemporary life in a world ruled by electronic devices. *Archives of Medical Science*, *14*(1), 190-198.
- Bull-Larsen, S., & Mohajeri, M. H. (2019). The potential influence of the bacterial microbiome on the development and progression of ADHD. *Nutrients*, *11*(11), 2805.
- Bunte, T. L., Schoemaker, K., Hessen, D. J., van der Heijden, P. G., & Matthys, W. (2013). Clinical usefulness of the Kiddie-Disruptive Behavior Disorder Schedule in the diagnosis of DBD and ADHD in preschool children. *Journal of Abnormal Child Psychology*, *41*, 681-690.
- Bush, N. R., Wakschlag, L. S., LeWinn, K. Z., Hertz-Picciotto, I., Nozadi, S. S., Pieper, S., ... & Posner, J. (2020). Family environment, neurodevelopmental risk, and the environmental influences on child health outcomes (ECHO) initiative: looking back and moving forward. *Frontiers in Psychiatry*, *11*, 547.
- Cappucino, G. J. R., and Sherman, B. (2010). *Microbiology: A Laboratory Manual*, Ninth Edition. The Benjamin Publishing Company, California
- Carter S. (2019). Orthomolecular Medicine. *Integrative medicine (Encinitas, Calif.)*, *18*(3), 74.
- Cekici, H., & Sanlier, N. (2019). Current nutritional approaches in managing autism spectrum disorder: A review. *Nutritional neuroscience*, *22*(3), 145–155.
- Chambers IV, E. (2019). Analysis of sensory properties in foods: A special issue. *Foods*, *8*(8), 291.
- Chang, J. P. C. (2021). Personalised medicine in child and Adolescent Psychiatry: Focus on omega-3 polyunsaturated fatty acids and ADHD. *Brain, Behavior, & Immunity-Health*, *16*, 100310.
- Chang, J. P. C., Su, K. P., Mondelli, V., Satyanarayanan, S. K., Yang, H. T., Chiang, Y. J., ... & Pariante, C. M. (2019). High-dose eicosapentaenoic acid (EPA) improves attention and vigilance in children and adolescents with attention deficit hyperactivity disorder (ADHD) and low endogenous EPA levels. *Translational psychiatry*, *9*(1), 303.
- Chang, S. K., Alasalvar, C., Bolling, B. W., & Shahidi, F. (2016). Nuts and their co-products: The impact of processing (roasting) on phenolics, bioavailability, and health benefits—A comprehensive review. *Journal of functional foods*, *26*, 88-122.
- Chen, V. C. H., Chan, H. L., Wu, S. I., Lu, M. L., Dewey, M. E., Stewart, R., & Lee, C. T. C. (2022). Methylphenidate and mortality in children with attention-deficit hyperactivity disorder: population-based cohort study. *The British Journal of Psychiatry*, *220*(2), 64-72.
- Chen, Y. L., Chen, V. C. H., & Gossop, M. (2021). Reliability and Validity of the Chen ADHD Scale (C-ADHDS). *Neuropsychiatric Disease and Treatment*, 229-237.
- Chodkiewicz, A. R., & Boyle, C. (2017). Positive psychology school-based interventions: A reflection on current success and future directions. *Review of Education*, *5*(1), 60-86.

- Chou, W. J., Lee, M. F., Hou, M. L., Hsiao, L. S., Lee, M. J., Chou, M. C., & Wang, L. J. (2018). Dietary and nutrient status of children with attentiondeficit/hyperactivity disorder: A case-control study. *Asia Pacific journal of clinical nutrition*, 27(6), 1325-1331.
- Coello, K. E., Frias, J., Martínez-Villaluenga, C., Cartea, M. E., Velasco, P., & Penas, E. (2022). Manufacture of healthy snack bars supplemented with moringa sprout powder. *LWT*, 154, 112828.
- Collins, C., Duncanson, K., & Burrows, T. (2014). A systematic review investigating associations between parenting style and child feeding behaviours. *Journal of Human Nutrition and Dietetics*, 27(6), 557-568.
- Contento, I. R., & Koch, P. A. (2020). *Nutrition Education: Linking Research, Theory, and Practice: Linking Research, Theory, and Practice*. Jones & Bartlett Learning.
- Cortese, S., & Tessari, L. (2017). Attention-deficit/hyperactivity disorder (ADHD) and obesity: update 2016. *Current psychiatry reports*, 19, 1-15.
- Costa-Pinto, F. A., & Basso, A. S. (2012). Neural and behavioral correlates of food allergy. *Allergy and the Nervous System*, 98, 222-239.
- Cross, F. L., Marchand, A. D., Medina, M., Villafuerte, A., & Rivas-Drake, D. (2019). Academic socialization, parental educational expectations, and academic self-efficacy among Latino adolescents. *Psychology in the Schools*, 56(4), 483-496.
- Curran, H. V., Freeman, T. P., Mokrysz, C., Lewis, D. A., Morgan, C. J., & Parsons, L. H. (2016). Keep off the grass? Cannabis, cognition and addiction. *Nature Reviews Neuroscience*, 17(5), 293-306.
- Curtin, K., Fleckenstein, A. E., Keeshin, B. R., Yurgelun-Todd, D. A., Renshaw, P. F., Smith, K. R., & Hanson, G. R. (2018). Increased risk of diseases of the basal ganglia and cerebellum in patients with a history of attention-deficit/hyperactivity disorder. *Neuropsychopharmacology*, 43(13), 2548-2555.
- Czaja-Bulsa, G. (2015). Non coeliac gluten sensitivity—A new disease with gluten intolerance. *Clinical nutrition*, 34(2), 189-194.
- da Silva, A. C. A., Matias, E. F., Rocha, J. E., de Araújo, A. C. J., de Freitas, T. S., Campina, F. F., ... & Coutinho, H. D. (2021). Gas chromatography coupled to mass spectrometry (GC-MS) characterization and evaluation of antibacterial bioactivities of the essential oils from *Piper arboreum* Aubl., *Piper aduncum* L. e *Piper gaudichaudianum* Kunth. *Zeitschrift für Naturforschung C*, 76(1-2), 35-42.
- Dahl, A. J., Milne, G. R., & Peltier, J. W. (2021). Digital health information seeking in an omnichannel environment: A shared decision-making and service-dominant logic perspective. *Journal of Business Research*, 125, 840-850.
- Dallacker, M., Hertwig, R., & Mata, J. (2018). The frequency of family meals and nutritional health in children: a meta-analysis. *Obesity Reviews*, 19(5), 638-653.

- Darabi, Z., Sangouni, A. A., Darand, M., Vasmehjani, A. A., & Hosseinzadeh, M. (2022). Dietary phytochemical index and attention-deficit/hyperactivity disorder in Iranian children: a case control study. *European Journal of Clinical Nutrition*, 76(3), 456-461.
- Darling Rasmussen, P., Ribeiro, J. P., & Storebø, O. J. (2021). Mothers of children diagnosed with ADHD: a descriptive study of maternal experience during the first three years of treatment. *Pediatric Reports*, 13(3), 450-462.
- Darling, N., & Steinberg, L. (2017). Parenting style as context: An integrative model. In *Interpersonal development* (pp. 161-170). Routledge.
- Das, M., Das Bhowmik, A., Sinha, S., Chattopadhyay, A., Chaudhuri, K., Singh, M., & Mukhopadhyay, K. (2006). MAOA promoter polymorphism and attention deficit hyperactivity disorder (ADHD) in Indian children. *American Journal of Medical Genetics Part B: Neuropsychiatric Genetics*, 141(6), 637-642.
- Daseking, M., Petermann, F., Tischler, T., & Waldmann, H. C. (2015). Smoking during pregnancy is a risk factor for executive function deficits in preschool-aged children. *Geburtshilfe und Frauenheilkunde*, 75(01), 64-71.
- Davidson, F., Cherry, K., & Corkum, P. (2016). Validating the behavior rating inventory of executive functioning for children with ADHD and their typically developing peers. *Applied Neuropsychology: Child*, 5(2), 127-137.
- de la Peña, I. C., Pan, M. C., Thai, C. G., & Alisso, T. (2020). Attention-deficit/hyperactivity disorder predominantly inattentive subtype/presentation: research progress and translational studies. *Brain sciences*, 10(5), 292.
- De, L. C. (2020). Edible seeds and nuts in human diet for immunity development. *Int. J. Recent Sci. Res*, 6(11), 38877-38881.
- Dhawan, S. (2020). Online learning: A panacea in the time of COVID-19 crisis. *Journal of educational technology systems*, 49(1), 5-22.
- Diniz do Nascimento, L., Barbosa de Moraes, A. A., Santana da Costa, K., Pereira Galúcio, J. M., Taube, P. S., Leal Costa, C. M., ... & Guerreiro de Faria, L. J. (2020). Bioactive natural compounds and antioxidant activity of essential oils from spice plants: New findings and potential applications. *Biomolecules*, 10(7), 988.
- Ditrich, I., Philipsen, A., & Matthies, S. (2021). Borderline personality disorder (BPD) and attention deficit hyperactivity disorder (ADHD) revisited—a review-update on common grounds and subtle distinctions. *Borderline Personality Disorder and Emotion Dysregulation*, 8, 1-12.
- Drammeh, W., Hamid, N. A., & Rohana, A. J. (2019). Determinants of household food insecurity and its association with child malnutrition in Sub-Saharan Africa: A review of the literature. *Current Research in Nutrition and Food Science Journal*, 7(3), 610-623.
- Drechsler, R., Brem, S., Brandeis, D., Grünblatt, E., Berger, G., & Walitza, S. (2020). ADHD: Current concepts and treatments in children and adolescents. *Neuropediatrics*, 51(05), 315-335.

- DuPaul, G. J., Fu, Q., Anastopoulos, A. D., Reid, R., & Power, T. J. (2020). ADHD parent and teacher symptom ratings: Differential item functioning across gender, age, race, and ethnicity. *Journal of Abnormal Child Psychology*, 48, 679-691.
- e Azevêdo, P. V. B., Caixeta, L. F., Taveira, D. L. R., Giglio, M. R. P., Do Rosario, M. C., & Rohde, L. A. (2020). Suggestive diagnosis of attention-deficit/hyperactivity disorder in indigenous children and adolescents from the Brazilian Amazon. *European Child & Adolescent Psychiatry*, 29, 373-384.
- El-Nmer, F., Salama, A. A., & Elhawary, D. (2014). Nutritional knowledge, attitude, and practice of parents and its impact on growth of their children. *Menoufia Medical Journal*, 27(3), 612.
- Energin, E., Rakicioglu, N., & Kiliç, B. G. (2015). Nutritional status of children with attention deficit hyperactivity disorder. *British Food Journal*.
- Faraone, S. V., & Larsson, H. (2019). Genetics of attention deficit hyperactivity disorder. *Molecular psychiatry*, 24(4), 562-575.
- Fardet, A., Dupont, D., Rioux, L. E., & Turgeon, S. L. (2019). Influence of food structure on dairy protein, lipid and calcium bioavailability: A narrative review of evidence. *Critical Reviews in Food Science and Nutrition*, 59(13), 1987-2010.
- Feldman, M. E., Charach, A., & Bélanger, S. A. (2018). ADHD in children and youth: part 2—treatment. *Paediatrics & child health*, 23(7), 462-472.
- Fenollar Cortés, J., Servera, M., Becker, S. P., & Burns, G. L. (2017). External validity of ADHD inattention and sluggish cognitive tempo dimensions in Spanish children with ADHD. *Journal of attention disorders*, 21(8), 655-666.
- Fink, A., & Beck, J. C. (2015). Developing and evaluating a website to guide older adults in their health information searches: a mixed-methods approach. *Journal of Applied Gerontology*, 34(5), 633-651.
- Flegal, K. M., & Cole, T. J. (2013). *Construction of LMS parameters for the Centers for Disease Control and Prevention 2000 growth charts* (No. 63). US Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics.
- Friedman, L. B., Silva, M., & Smith, K. (2018). A focus group study observing maternal intention to use a WIC education app. *American Journal of Health Behavior*, 42(6), 110-123.
- Garcia Rosales, A., Vitoratou, S., Banaschewski, T., Asherson, P., Buitelaar, J., Oades, R. D., ... & Chen, W. (2015). Are all the 18 DSM-IV and DSM-5 criteria equally useful for diagnosing ADHD and predicting comorbid conduct problems?. *European child & adolescent psychiatry*, 24, 1325-1337.
- Gaur, S., & Pallanti, S. (2020). Treatment outcomes in an adult attention deficit hyperactivity disorder clinic with a focus on executive functioning and sluggish cognitive tempo. *Cureus*, 12(8).
- Gavaravarapu, S. M. (2019). Nutrition communication-Rhetoric & reality. *The Indian journal of medical research*, 149(3), 333.

- Georgsson, M., & Stagers, N. (2016). Quantifying usability: an evaluation of a diabetes mHealth system on effectiveness, efficiency, and satisfaction metrics with associated user characteristics. *Journal of the American Medical Informatics Association*, 23(1), 5-11.
- Gerans, R., & Waluyo, A. (2019). A PSYCHOSOCIAL INTERVENTION FOR MENTAL HEALTH OF PEOPLE WITH HIV (PLWH): A LITERATURE REVIEW. *International Journal of Nursing and Health Services (IJNHS)*, 2(3), 45-57.
- Geuijen, P. M., Buitelaar, J. K., Fliers, E. A., Maras, A., Schweren, L. J., Oosterlaan, J., ... & Rommelse, N. N. (2019). Overweight in family members of probands with ADHD. *European Child & Adolescent Psychiatry*, 28, 1659-1669.
- Gevers, D. W., Kremers, S. P., De Vries, N. K., & Van Assema, P. (2015). Patterns of food parenting practices and children's intake of energy-dense snack foods. *Nutrients*, 7(6), 4093-4106.
- Ghosh, P., Choudhury, H. A., & Victor, R. (2018). Prevalence of attention deficit hyperactivity disorder among primary school children in Cachar, Assam, North-East India. *Open Journal of Psychiatry & Allied Sciences*, 9(2), 130-135.
- Gnanavel, S., Sharma, P., Kaushal, P., & Hussain, S. (2019). Attention deficit hyperactivity disorder and comorbidity: A review of literature. *World journal of clinical cases*, 7(17), 2420.
- Gómez-Pinilla, F. (2008). Brain foods: the effects of nutrients on brain function. *Nature reviews neuroscience*, 9(7), 568-578.
- Gonzalez, J. E., Liew, J., Zou, Y., Curtis, G., & Li, D. (2022). "They're Going to Forget About Their Mother Tongue": Influence of Chinese beliefs in child home language and literacy development. *Early Childhood Education Journal*, 50(7), 1109-1120.
- Gonzalez-Estrada, A., Cuervo-Pardo, L., Ghosh, B., Smith, M., Pazheri, F., Zell, K., ... & Lang, D. M. (2015, November). Popular on YouTube: a critical appraisal of the educational quality of information regarding asthma. In *Allergy & Asthma Proceedings* (Vol. 36, No. 6).
- Gonzalez-Palacios, S., Navarrete-Muñoz, E. M., García-de-la-Hera, M., Torres-Collado, L., Santa-Marina, L., Amiano, P., ... & Vioque, J. (2019). Sugar-containing beverages consumption and obesity in children aged 4–5 years in Spain: the INMA study. *Nutrients*, 11(8), 1772.
- Grady, A., Yoong, S., Sutherland, R., Lee, H., Nathan, N., & Wolfenden, L. (2018). Improving the public health impact of eHealth and mHealth interventions. *Australian and New Zealand journal of public health*, 42(2).
- Greenhawt, M., Wallace, D., Sublett, J. W., Maughan, E., Tanner, A., Kelley, K. J., ... & Pistiner, M. (2018). Current trends in food allergy-induced anaphylaxis management at school. *Annals of Allergy, Asthma & Immunology*, 121(2), 174-178.
- Grimes, C. A., Booth, A., Khokhar, D., West, M., Margerison, C., Campbell, K. J., & Nowson, C. A. (2018). Digital education to limit salt in the home (DELISH) program improves knowledge, self-efficacy, and behaviors among children. *Journal of nutrition education and behavior*, 50(6), 547-554.

- Grizenko, N., Shayan, Y. R., Polotskaia, A., Ter-Stepanian, M., & Joobar, R. (2008). Relation of maternal stress during pregnancy to symptom severity and response to treatment in children with ADHD. *Journal of Psychiatry and Neuroscience*, 33(1), 10-16.
- Gu, H., Jasbi, P., Patterson, J., & Jin, Y. (2021). Enhanced Detection of Short-Chain Fatty Acids Using Gas Chromatography Mass Spectrometry. *Current protocols*, 1(6), e177.
- Guney, E., Cetin, F. H., & Iseri, E. (2015). The role of environmental factors in etiology of attention-deficit hyperactivity disorder. *ADHD—new directions in diagnosis and treatment*, 15-34.
- Güngör, S., Celiloğlu, Ö. S., Raif, S. G., Özcan, Ö. Ö., & Selimoğlu, M. A. (2016). Malnutrition and obesity in children with ADHD. *Journal of attention disorders*, 20(8), 647-652.
- Gupta, Rashmi & Kar, Bhoomika. (2015). Gupta R, Kar BR. Development of attentional processes in ADHD and normal children. *Prog Brain Res* 176: 259-276. *Progress in brain research*. 176. 259-76. 10.1016/S0079-6123(09)17614-8.
- Guzek, D., Głabska, D., Lange, E., & Jezewska-Zychowicz, M. (2017). A Polish study on the influence of food neophobia in children (10–12 years old) on the intake of vegetables and fruits. *Nutrients*, 9(6), 563.
- Halperin, J. M., Bédard, A. C. V., & Curchack-Lichtin, J. T. (2012). Preventive interventions for ADHD: a neurodevelopmental perspective. *Neurotherapeutics*, 9, 531-541.
- Händel, M. N., Rohde, J. F., Rimestad, M. L., Bandak, E., Birkefoss, K., Tendal, B., ... & Callesen, H. E. (2021). Efficacy and safety of polyunsaturated fatty acids supplementation in the treatment of attention deficit hyperactivity disorder (ADHD) in children and adolescents: a systematic review and meta-analysis of clinical trials. *Nutrients*, 13(4), 1226.
- Hareven, T. K. (2018). Families, history, and social change: Life-course and cross-cultural perspectives. *Families, History and Social Change: Life Course and Cross-Cultural Perspectives*, 1–374.
- Harun-Or-Rashid, M., Hasnat Mohiuddin, A., Faruque, O., Sarkar, B., Alamgir, K., Yousuf, A.K., & Reza, S. (2021). Factor Related to Nutritional Status of Children with Disability Living in Dhaka City, Bangladesh. *Acta Scientifci Nutritional Health*.
- Hassan, M. M., Al Nuaim, A., Osman, S. R., Hassan, M. D., & Ismail, T. M. (2022). Diet and physical exercises for preschoolers with ADHD and their mothers: An intervention study. *Complementary Therapies in Medicine*, 67, 102826.
- Hayes, D., Angove, M. J., Tucci, J., & Dennis, C. (2016). Walnuts (*Juglans regia*) chemical composition and research in human health. *Critical reviews in food science and nutrition*, 56(8), 1231-1241.
- Hemamy, M., Pahlavani, N., Amanollahi, A., Islam, S. M. S., McVicar, J., Askari, G., & Malekahmadi, M. (2021). The effect of vitamin D and magnesium supplementation on the mental health status of attention-deficit hyperactive children: a randomized controlled trial. *BMC pediatrics*, 21(1), 1-8.

- Henström, M., Duncanson, K., Collins, C. E., Ashton, L. M., Davidson, E., & Ball, R. (2022). Online reach and engagement of a child nutrition peer-education program (PICNIC): insights from social media and web analytics. *BMC Public Health*, 22(1), 836.
- Heo, Y., Kim, M. J., Lee, J. W., & Moon, B. (2019). Muffins enriched with dietary fiber from kimchi by-product: Baking properties, physical–chemical properties, and consumer acceptance. *Food science & nutrition*, 7(5), 1778-1785.
- Heo, Y., Kim, M. J., Lee, J. W., & Moon, B. (2019). Muffins enriched with dietary fiber from kimchi by-product: Baking properties, physical–chemical properties, and consumer acceptance. *Food science & nutrition*, 7(5), 1778-1785.
- Herath, H. T., Samaranyake, M. D. W., Liyanage, S., & Abeysekera, W. K. S. M. (2020) Horse Gram: an incredible food grain as a potential source of functional and nutritional food ingredient. *International Journal of Food Science and Nutrition*, 5(4), 93-101
- Hollander, J. E., & Carr, B. G. (2020). Virtually perfect? Telemedicine for COVID-19. *New England Journal of Medicine*, 382(18), 1679-1681.
- Indrawati, D. R., & Nuryanto, N. (2016). Hubungan Status Gizi Dan Lingkar Kepala Dengan Kemampuan Motorik Kasar Anak Usia 1-2 Tahun Di Kecamatan Brati Kabupaten Grobogan. *Journal of Nutrition College*, 5(4), 469-474.
- Islam, K., Seth, S., Saha, S., Roy, A., Das, R., & Datta, A. K. (2018). A study on association of iron deficiency with attention deficit hyperactivity disorder in a tertiary care center. *Indian journal of psychiatry*, 60(1), 131.
- James, D. C., & Harville, C. (2018). Smartphone usage, social media engagement, and willingness to participate in mHealth weight management research among African American women. *Health Education & Behavior*, 45(3), 315-322.
- Jarosz, M., Olbert, M., Wyszogrodzka, G., Młyniec, K., & Librowski, T. (2017). Antioxidant and anti-inflammatory effects of zinc. Zinc-dependent NF-κB signaling. *Inflammopharmacology*, 25, 11-24.
- Jayathilake, C., Visvanathan, R., Deen, A., Bangamuwage, R., Jayawardana, B. C., Nammi, S., & Liyanage, R. (2018). Cowpea: an overview on its nutritional facts and health benefits. *Journal of the Science of Food and Agriculture*, 98(13), 4793-4806.
- Jensen, C. M., & Steinhausen, H. C. (2015). Comorbid mental disorders in children and adolescents with attention-deficit/hyperactivity disorder in a large nationwide study. *Attention deficit and hyperactivity disorders*, 7(1), 27–38.
- Joseph, J. K., & Devu, B. K. (2019). Prevalence of attention-deficit hyperactivity disorder in India: A systematic review and meta-analysis. *Indian Journal of Psychiatric Nursing*, 16(2), 118.
- Joyce-Beaulieu, D., & Sulkowski, M. L. (2016). The diagnostic and statistical manual of mental disorders: (DSM-5) model of impairment. *Assessing impairment: From theory to practice*, 167-189.

- Kamath, S. M., Venkatappa, K. G., & Sparshadeep, E. M. (2017). Impact of nutritional status on cognition in institutionalized orphans: a pilot study. *Journal of clinical and diagnostic research: JCDR*, *11*(3), CC01.
- Kamiński, B., Poulin, V., Prałat, P., Szufel, P., & Théberge, F. (2019). Clustering via hypergraph modularity. *PloS one*, *14*(11), e0224307.
- Karaaslan Ayhan, N., & Yaman, M. (2022). Evaluation of iron and zinc contents of some fish species. *Biological Trace Element Research*, *200*(3), 1376-1382.
- Katzmarzyk, P. T., Chaput, J. P., Fogelholm, M., Hu, G., Maher, C., Maia, J., ... & Tudor-Locke, C. (2019). International Study of Childhood Obesity, Lifestyle and the Environment (ISCOLE): contributions to understanding the global obesity epidemic. *Nutrients*, *11*(4), 848.
- Kayat, H. P., Gautam, S. D., & Jha, R. N. (2016). GC-MS analysis of hexane extract of *Zanthoxylum armatum* DC. fruits. *Journal of Pharmacognosy and Phytochemistry*, *5*(2), 58-62.
- Keller, H. (2018). Parenting and socioemotional development in infancy and early childhood. *Developmental Review*, *50*, 31-41.
- Kerekes, N., Tajnia, A., Lichtenstein, P., Lundström, S., Anckarsäter, H., Nilsson, T., & Råstam, M. (2015). Neurodevelopmental problems and extremes in BMI. *PeerJ*, *3*, e1024.
- Khadse, R. P., & Chaurasia, H. (2020). Nutrition status and inequality among children in different geographical regions of Maharashtra, India. *Clinical Epidemiology and Global Health*, *8*(1), 128-137.
- Khamis, A. G., Mwanri, A. W., Ntwenya, J. E., & Kreppel, K. (2019). The influence of dietary diversity on the nutritional status of children between 6 and 23 months of age in Tanzania. *BMC pediatrics*, *19*(1), 1-9.
- Khan, F. H., Ahlberg, C. D., Chow, C. A., Shah, D. R., & Koo, B. B. (2017). Iron, dopamine, genetics, and hormones in the pathophysiology of restless legs syndrome. *Journal of neurology*, *264*, 1634-1641.
- Khosravi, P., Rezvani, A., & Wiewiora, A. (2016). The impact of technology on older adults' social isolation. *Computers in Human Behavior*, *63*, 594-603.
- Kim, Y., & Chang, H. (2011). Correlation between attention deficit hyperactivity disorder and sugar consumption, quality of diet, and dietary behavior in school children. *Nutrition research and practice*, *5*(3), 236-245.
- Kluwe, F., Michelet, R., Mueller-Schoell, A., Maier, C., Klopp-Schulze, L., van Dyk, M., ... & Kloft, C. (2021). Perspectives on model-informed precision dosing in the digital health era: challenges, opportunities, and recommendations. *Clinical Pharmacology & Therapeutics*, *109*(1), 29-36.
- Knowlden, A. P., Sharma, M., Cottrell, R. R., Wilson, B. R., & Johnson, M. L. (2015). Impact evaluation of enabling mothers to prevent pediatric obesity through web-based education and reciprocal determinism (EMPOWER) randomized control trial. *Health Education & Behavior*, *42*(2), 171-184.

- Köbe, T., Witte, A. V., Schnelle, A., Lesemann, A., Fabian, S., Tesky, V. A., ... & Flöel, A. (2016). Combined omega-3 fatty acids, aerobic exercise and cognitive stimulation prevents decline in gray matter volume of the frontal, parietal and cingulate cortex in patients with mild cognitive impairment. *Neuroimage*, *131*, 226-238.
- Koralagama, D., Wickrama, S., & Adikari, A. (2021). A Preliminary analysis of the social economy of dried fish in Sri Lanka. *Dried Fish Matters. University of Ruhuna, Matara*.
- Kubb, C., & Foran, H. M. (2020). Online health information seeking by parents for their children: systematic review and agenda for further research. *Journal of Medical Internet Research*, *22*(8), e19985.
- Kuchtová, V., Kohajdová, Z., Karovicova, J., & Lauková, M. (2018). Physical, textural and sensory properties of cookies incorporated with grape skin and seed preparations. *Polish Journal of Food and Nutrition Sciences*, *68*(4).
- Kulczyński, B., Kobus-Cisowska, J., Taczanowski, M., Kmiecik, D., & Gramza-Michałowska, A. (2019). The chemical composition and nutritional value of chia seeds—Current state of knowledge. *Nutrients*, *11*(6), 1242.
- Kumar, S., & Kelly, A. S. (2017). Review of Childhood Obesity: From Epidemiology, Etiology, and Comorbidities to Clinical Assessment and Treatment. *Mayo Clinic proceedings*, *92*(2), 251–265.
- Kumar, V., Jaiswal, K. K., Verma, M., Vlaskin, M. S., Nanda, M., Chauhan, P. K., ... & Kim, H. (2021). Algae-based sustainable approach for simultaneous removal of micropollutants, and bacteria from urban wastewater and its real-time reuse for aquaculture. *Science of The Total Environment*, *774*, 145556.
- Kummer, A., Barbosa, I. G., Rodrigues, D. H., Rocha, N. P., Rafael, M. D. S., Pfeilsticker, L., ... & Teixeira, A. L. (2016). Frequency of overweight and obesity in children and adolescents with autism and attention deficit/hyperactivity disorder. *Revista Paulista de Pediatria*, *34*, 71-77.
- Kyriakopoulou, K., Keppler, J. K., & van der Goot, A. J. (2021). Functionality of ingredients and additives in plant-based meat analogues. *Foods*, *10*(3), 600.
- Lam, L. F., & Lawlis, T. R. (2017). Feeding the brain—The effects of micronutrient interventions on cognitive performance among school-aged children: A systematic review of randomized controlled trials. *Clinical Nutrition*, *36*(4), 1007-1014.
- Lappan, L., Yeh, M., & Leung, M. (2015). Technology as a platform for improving healthy behaviors and weight status in children and adolescents: a review. *Obes Open Access*, *1*(3), 1-9.
- Lau-Jensen, S. H., Asschenfeldt, B., Evald, L., & Hjortdal, V. E. (2021). Hyperactivity and inattention in young patients born with an atrial septal or ventricular septal defect. *Frontiers in Pediatrics*, 1364.
- Lautarescu, A., Craig, M. C., & Glover, V. (2020). Prenatal stress: Effects on fetal and child brain development. *International review of neurobiology*, *150*, 17-40.

- Laws, R. A., Litterbach, E. K. V., Denney-Wilson, E. A., Russell, C. G., Taki, S., Ong, K. L., ... & Campbell, K. J. (2016). A comparison of recruitment methods for an mHealth intervention targeting mothers: lessons from the growing healthy program. *Journal of Medical Internet Research, 18*(9), e248.
- Lee, D., & McLanahan, S. (2015). Family Structure Transitions and Child Development: Instability, Selection, and Population Heterogeneity. *American sociological review, 80*(4), 738–763.
- Lee, K. S., Choi, Y. J., Lim, Y. H., Lee, J. Y., Shin, M. K., Kim, B. N., ... & Hong, Y. C. (2022). Dietary patterns are associated with attention-deficit hyperactivity disorder (ADHD) symptoms among preschoolers in South Korea: a prospective cohort study. *Nutritional Neuroscience, 25*(3), 603-611.
- Lernimitmongkol, W., & Mongkontanawat, N. (2020). Product development of fish tofu supplemented with Malva nut gum. *8*(5):2057-2070
- Li, Y., Sun, Y., Zhong, M., Xie, F., Wang, H., Li, L., ... & Zhang, S. (2020). Digestibility, textural and sensory characteristics of cookies made from residues of enzyme-assisted aqueous extraction of soybeans. *Scientific Reports, 10*(1), 4222.
- Litchford, A., Roskos, M. R. S., & Wengreen, H. (2020). Influence of fathers on the feeding practices and behaviors of children: A systematic review. *Appetite, 147*, 104558.
- Litterbach, E. K., Russell, C. G., Taki, S., Denney-Wilson, E., Campbell, K. J., & Laws, R. A. (2017). Factors influencing engagement and behavioral determinants of infant feeding in an mHealth program: qualitative evaluation of the growing healthy program. *JMIR mHealth and uHealth, 5*(12), e8515.
- Liu, D., Ren, Y., Wu, T., Shen, H., Yan, P., Meng, Y., ... & Zhao, J. (2022). Parental smoking exposure before and during pregnancy and offspring attention-deficit/hyperactivity disorder risk: A Chinese child and adolescent cohort study. *Frontiers in Public Health, 10*.
- Lokossou, Y. U. A., Tambe, A. B., Azandjèmè, C., & Mbhenyane, X. (2021). Socio-cultural beliefs influence feeding practices of mothers and their children in Grand Popo, Benin. *Journal of Health, Population and Nutrition, 40*, 1-12.
- Lončar, B., Pezo, L., Filipović, V., Nićetin, M., Filipović, J., Pezo, M., ... & Acimović, M. (2022). Physico-chemical, textural and sensory evaluation of spelt muffins supplemented with apple powder enriched with sugar beet molasses. *Foods, 11*(12), 1750.
- Lopresti, A. L. (2015). Oxidative and nitrosative stress in ADHD: possible causes and the potential of antioxidant-targeted therapies. *ADHD Attention Deficit and Hyperactivity Disorders, 7*(4), 237-247.
- Lua, P. L., & Elena, W. D. W. P. (2012). The impact of nutrition education interventions on the dietary habits of college students in developed nations: a brief review. *The Malaysian journal of medical sciences: MJMS, 19*(1), 4.
- Luesse, H. B., Paul, R., Gray, H. L., Koch, P., Contento, I., & Marsick, V. (2018). Challenges and facilitators to promoting a healthy food environment and communicating effectively with

- parents to improve food behaviors of school children. *Maternal and Child Health Journal*, 22, 958-967.
- Luo, Y., Weibman, D., Halperin, J. M., & Li, X. (2019). A review of heterogeneity in attention deficit/hyperactivity disorder (ADHD). *Frontiers in human neuroscience*, 13, 42.
- Lupton, D. (2019). Toward a more-than-human analysis of digital health: Inspirations from feminist new materialism. *Qualitative health research*, 29(14), 1998-2009.
- Ly, V., Bottelier, M., Hoekstra, P. J., Arias Vasquez, A., Buitelaar, J. K., & Rommelse, N. N. (2017). Elimination diets' efficacy and mechanisms in attention deficit hyperactivity disorder and autism spectrum disorder. *European child & adolescent psychiatry*, 26, 1067-1079.
- Madzhidova, S., & Sedrakyan, L. (2019). The use of dietary interventions in pediatric patients. *Pharmacy*, 7(1), 10.
- Mahamadi, A., & Sastry, S. (2016). Bond graph models for human behavior. *2016 Conference of Basic Sciences and Engineering Studies (SGCAC)*, 110-115.
- Makoka, D., & Masibo, P. K. (2015). Is there a threshold level of maternal education sufficient to reduce child undernutrition? Evidence from Malawi, Tanzania and Zimbabwe. *BMC pediatrics*, 15(1), 1-10.
- Mangrio, E., Persson, K., & Bramhagen, A. C. (2018). Sociodemographic, physical, mental and social factors in the cessation of breastfeeding before 6 months: a systematic review. *Scandinavian journal of caring sciences*, 32(2), 451-465.
- Manohar, H., Kuppili, P. P., Kandasamy, P., Chandrasekaran, V., & Rajkumar, R. P. (2018). Implications of comorbid ADHD in ASD interventions and outcome: Results from a naturalistic follow up study from south India. *Asian journal of psychiatry*, 33, 68-73.
- Margier, M., Georgé, S., Hafnaoui, N., Remond, D., Nowicki, M., Du Chaffaut, L., ... & Reboul, E. (2018). Nutritional composition and bioactive content of legumes: Characterization of pulses frequently consumed in France and effect of the cooking method. *Nutrients*, 10(11), 1668.
- Marías, Y. F., & Glasauer, P. (2014). *Guidelines for assessing nutrition-related knowledge, attitudes and practices*. Food and Agriculture Organization of the United Nations (FAO).
- Markless, S., & Streatfield, D. (2017). How can you tell if it's working? Recent developments in impact evaluation and their implications for information literacy practice. *Journal of Information Literacy*, 11(1).
- Matías, J., Rodríguez, M. J., Granado-Rodríguez, S., Cruz, V., Calvo, P., & Reguera, M. (2022). Changes in quinoa seed fatty acid profile under heat stress field conditions. *Frontiers in Nutrition*, 456.
- Matthews, M., Nigg, J. T., & Fair, D. J. (2014). Attention deficit hyperactive disorder. *Current Topics in Behavioral Neuroscience*, 16, 235-266.
- Mazzeschi, C., Buratta, L., Germani, A., Cavallina, C., Ghignoni, R., Margheriti, M., & Pazzagli, C. (2019). Parental reflective functioning in mothers and fathers of children with ADHD: Issues regarding assessment and implications for intervention. *Frontiers in public health*, 7, 263.

- McClain, M. B., Hasty Mills, A. M., & Murphy, L. E. (2017). Inattention and hyperactivity/impulsivity among children with attention-deficit hyperactivity-disorder, autism spectrum disorder, and intellectual disability. *Research in developmental disabilities, 70*, 175–184.
- Meccariello, R., & D’Angelo, S. (2021). Impact of polyphenolic-food on longevity: an elixir of life. An overview. *Antioxidants, 10*(4), 507.
- Medawar, E., Huhn, S., Villringer, A., & Veronica Witte, A. (2019). The effects of plant-based diets on the body and the brain: a systematic review. *Translational psychiatry, 9*(1), 226.
- Meister, S., Deiters, W., & Becker, S. (2016). Digital health and digital biomarkers—enabling value chains on health data. *Current Directions in Biomedical Engineering, 2*(1), 577-581.
- Merz, E. C., Tottenham, N., & Noble, K. G. (2018). Socioeconomic status, amygdala volume, and internalizing symptoms in children and adolescents. *Journal of Clinical Child & Adolescent Psychology, 47*(2), 312-323.
- Meskó, B., Drobni, Z., Bényei, É., Gergely, B., & Györffy, Z. (2017). Digital health is a cultural transformation of traditional healthcare. *Mhealth, 3*.
- Mesra, B. (2018). Factors That Influencing Households Income And Its Contribution On Family Income In Hamparan Perak Sub-District, Deli Serdang Regency, North. *Int. J. Civ. Eng. Technol, 9*(10), 461-469.
- Messina, M., Rogero, M. M., Fisberg, M., & Waitzberg, D. (2017). Health impact of childhood and adolescent soy consumption. *Nutrition reviews, 75*(7), 500-515.
- Metzger, M. M. (2015). *Examining birth order and sibship patterns in children diagnosed with ASD and ADHD* (Doctoral dissertation, Adler School of Professional Psychology).
- Miguel, P. M., Pereira, L. O., Silveira, P. P., & Meaney, M. J. (2019). Early environmental influences on the development of children's brain structure and function. *Developmental Medicine & Child Neurology, 61*(10), 1127-1133.
- Mikirova, N. (2015). Clinical test of pyrroles: usefulness and association with other biochemical markers. *Clin Med Rev Case Rep, 2*, 027.
- Milakovich, M.E., and Wise, J.M. (2019). Digital learning: The challenges of borderless education. Edward Elgar Publishing. pp. 2 -4
- Min, X., Li, C., & Yan, Y. (2021). Parental age and the risk of ADHD in offspring: a systematic review and meta-analysis. *International Journal of Environmental Research and Public Health, 18*(9), 4939.
- Mitra-Ganguli, T., Kalita, S., Bhushan, S., Stough, C., Kean, J., Wang, N., ... & Khadilkar, A. (2017). A randomized, double-blind study assessing changes in cognitive function in Indian school children receiving a combination of Bacopa monnieri and micronutrient supplementation vs. placebo. *Frontiers in pharmacology, 678*.
- Mohammadi, M. R., Zarafshan, H., Khaleghi, A., Ahmadi, N., Hooshyari, Z., Mostafavi, S. A., ... & Salmanian, M. (2021). Prevalence of ADHD and its comorbidities in a population-based sample. *Journal of Attention Disorders, 25*(8), 1058-1067.

- Mohammed, J., & Sumaila, F. (2015). Relationship between anthropometric variables and lung function parameters among primary school children. *Annals of Nigerian Medicine*, 9(1), 20-20.
- Molina, B. S., & Pelham Jr, W. E. (2014). Attention-deficit/hyperactivity disorder and risk of substance use disorder: Developmental considerations, potential pathways, and opportunities for research. *Annual review of clinical psychology*, 10, 607-639.
- Moosavi-Nasab, M., Mirzapour-Kouhdasht, A., & Oliyaei, N. (2019). Application of essential oils for shelf-life extension of seafood products. In *Essential Oils-Oils of Nature*. IntechOpen.
- Morin, A. J., Tran, A., & Caci, H. (2016). Factorial validity of the ADHD Adult Symptom Rating Scale in a French community sample: Results from the ChiP-ARD Study. *Journal of attention disorders*, 20(6), 530-541.
- Morris, A. S., Wakschlag, L., Krogh-Jespersen, S., Fox, N., Planalp, B., Perlman, S. B., ... & Johnson, S. P. (2020). Principles for guiding the selection of early childhood neurodevelopmental risk and resilience measures: HEALTHY Brain and Child Development Study as an Exemplar. *Adversity and Resilience Science*, 1, 247-267.
- Murnane, R. J., & Reardon, S. F. (2018). Long-term trends in private school enrollments by family income. *AERA Open*, 4(1), 2332858417751355.
- Murray, E., Hekler, E. B., Andersson, G., Collins, L. M., Doherty, A., Hollis, C., ... & Wyatt, J. C. (2016). Evaluating digital health interventions: key questions and approaches. *American journal of preventive medicine*, 51(5), 843-851.
- Murugan, S. S., & Srinivasan, V. (2016). Association of bone age with overweight and obesity in children in the age group of 8 to 11 years. *International Journal of Contemporary Pediatrics*, 3(3), 1.
- Naik, A., Patel, S., & Biswas, D. A. (2016). Prevalence of ADHD in a rural Indian population. *Innov J Med Health Sci*, 11, 45-6.
- Nair, M. S., Tomar, M., Punia, S., Kukula-Koch, W., & Kumar, M. (2020). Enhancing the functionality of chitosan-and alginate-based active edible coatings/films for the preservation of fruits and vegetables: A review. *International Journal of Biological Macromolecules*, 164, 304-320.
- NCERT (2021). Psychology Textbook for class XII. National Council of Educational Research and Training, Sri Aurobindo Marg, New Delhi, India.
- Nekitsing, C., Hetherington, M. M., & Blundell-Birtill, P. (2018). Developing healthy food preferences in preschool children through taste exposure, sensory learning, and nutrition education. *Current obesity reports*, 7, 60-67.
- NHANES (2016), Anthropometry Procedures Manual, 12-16.
- Niaz, K., Khan, F., & Shah, M. A. (2020). Analysis of carbohydrates (monosaccharides, polysaccharides). In *Recent Advances in Natural Products Analysis* (pp. 621-633). Elsevier.
- Nigg, J. T., & Holton, K. (2014). Restriction and elimination diets in ADHD treatment. *Child and Adolescent Psychiatric Clinics*, 23(4), 937-953.

- Nigg, J. T., Johnstone, J. M., Musser, E. D., Long, H. G., Willoughby, M. T., & Shannon, J. (2016). Attention-deficit/hyperactivity disorder (ADHD) and being overweight/obesity: New data and meta-analysis. *Clinical psychology review, 43*, 67-79.
- Niina, A., Eyre, O., Wootton, R., Stergiakouli, E., Thapar, A., & Riglin, L. (2022). Exploring ADHD symptoms and associated impairment across development. *Journal of attention disorders, 26*(6), 822-830.
- Novis-Deutsch, N., Dayan, H., Pollak, Y., & Khoury-Kassabri, M. (2022). Religiosity as a moderator of ADHD-related antisocial behaviour and emotional distress among secular, religious and Ultra-Orthodox Jews in Israel. *International Journal of Social Psychiatry, 68*(4), 773-782.
- Null, G., Pennesi, L., & Feldman, M. (2017). Nutrition and lifestyle intervention on mood and neurological disorders. *Journal of evidence-based complementary & alternative medicine, 22*(1), 68-74.
- Nyström, C. D., Sandin, S., Henriksson, P., Henriksson, H., Trolle-Lagerros, Y., Larsson, C., ... & Löf, M. (2017). Mobile-based intervention intended to stop obesity in preschool-aged children: the MINISTOP randomized controlled trial. *The American journal of clinical nutrition, 105*(6), 1327-1335.
- O'Malley, G. C., Shultz, S. P., Thivel, D., & Tsiros, M. D. (2021). Neuromusculoskeletal health in pediatric obesity: incorporating evidence into clinical examination. *Current Obesity Reports, 10*(4), 467-477.
- O'Neill, S., Rajendran, K., Mahbubani, S. M., & Halperin, J. M. (2017). Preschool predictors of ADHD symptoms and impairment during childhood and adolescence. *Current psychiatry reports, 19*, 1-15.
- Okoth, J. K., Ochola, S. A., Gikonyo, N. K., & Makokha, A. (2017). Development of a nutrient-dense complementary food using amaranth-sorghum grains. *Food science & nutrition, 5*(1), 86-93.
- Omage, K., & Omuemu, V. O. (2018). Assessment of dietary pattern and nutritional status of undergraduate students in a private university in southern Nigeria. *Food science & nutrition, 6*(7), 1890-1897.
- Oranusi, S. U., Omagbemi, F., & Eni, A. O. (2011). Microbiological safety evaluation of snacks sold in fast food shops in Ota, Ogun state, Nigeria. *International journal of Agricultural and Food science, 1*(4), 75-79.
- Osei-Assibey, G., & Boachie, C. (2012). Dietary interventions for weight loss and cardiovascular risk reduction in people of African ancestry (blacks): a systematic review. *Public health nutrition, 15*(1), 110-115.
- Osland, S., Hirsch, L., & Pringsheim, T. (2017). Smoking, alcohol and drug use in youth and adults with attention-deficit hyperactivity disorder. *BJPsych open, 3*(3), 141-146.
- Ostovic, Z., Catipovic, M., Hrgovic, Z., Lagancic, M., Vusic, I., Fures, R., ... & Feratovic, F. (2021). Breastfeeding Promotion and the Results of the Maternity Ward—a Friend of Children Initiative Implementation in Bjelovar-Bilogora County in 2018. *Materia Socio-medica, 33*(4), 269.

- Oxelgren, U. W., Myrelid, Å., Annerén, G., Ekstam, B., Göransson, C., Holmbom, A., ... & Fernell, E. (2017). Prevalence of autism and attention-deficit–hyperactivity disorder in Down syndrome: a population-based study. *Developmental Medicine & Child Neurology*, 59(3), 276-283.
- Paes, V. M., Ong, K. K., & Lakshman, R. (2015). Factors influencing obesogenic dietary intake in young children (0–6 years): systematic review of qualitative evidence. *BMJ open*, 5(9), e007396.
- Patel, D. R., & Merrick, J. (2020). Neurodevelopmental and neurobehavioral disorders. *Translational Pediatrics*, 9(Suppl 1), S1.
- Pathare, P. B., Opara, U. L., & Al-Said, F. A. J. (2013). Colour measurement and analysis in fresh and processed foods: a review. *Food and bioprocess technology*, 6, 36-60.
- Pelsser, L. M., Frankena, K., Toorman, J., & Rodrigues Pereira, R. (2017). Diet and ADHD, reviewing the evidence: a systematic review of meta-analyses of double-blind placebo-controlled trials evaluating the efficacy of diet interventions on the behavior of children with ADHD. *PloS one*, 12(1), e0169277.
- Pendergast, F. J., Ridgers, N. D., Worsley, A., & McNaughton, S. A. (2017). Evaluation of a smartphone food diary application using objectively measured energy expenditure. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 1-10.
- Perera, T., Frei, S., Frei, B., Wong, S. S., & Bobe, G. (2015). Improving nutrition education in us elementary schools: Challenges and opportunities. *Journal of education and practice*, 6(30), 41-50.
- Petra, A. I., Panagiotidou, S., Hatziaelaki, E., Stewart, J. M., Conti, P., & Theoharides, T. C. (2015). Gut-microbiota-brain axis and its effect on neuropsychiatric disorders with suspected immune dysregulation. *Clinical therapeutics*, 37(5), 984-995.
- Pfeiffer, C., Speck, M., & Strassner, C. (2017). What leads to lunch—How social practices impact (non) sustainable food consumption/eating habits. *Sustainability*, 9(8), 1437.
- Pfiffner, L. J., & Haack, L. M. (2014). Behavior management for school-aged children with ADHD. *Child and Adolescent Psychiatric Clinics*, 23(4), 731-746.
- Pimentel, T. C., Gomes da Cruz, A., & Deliza, R. (2015). Sensory Evaluation: Sensory Rating and Scoring Methods, ; Number 2007.
- Pisk, S. V., Vuk, T., Ivezić, E., Jukić, I., Bingulac-Popović, J., & Filipčić, I. (2019). ABO blood groups and psychiatric disorders: a Croatian study. *Blood transfusion*, 17(1), 66.
- Polanczyk, G., De Lima, M. S., Horta, B. L., Biederman, J., & Rohde, L. A. (2007). The worldwide prevalence of ADHD: a systematic review and metaregression analysis. *American journal of psychiatry*, 164(6), 942-948.
- Potenza, M. N., Faust, K., & Faust, D. (Eds.). (2020). *The Oxford Handbook of Digital technologies and mental health*. Oxford University Press.
- Prasad, S. K., & Singh, M. K. (2015). Horse gram-an underutilized nutraceutical pulse crop: a review. *Journal of food science and technology*, 52, 2489-2499.

- Puts, N. A., Harris, A. D., Mikkelsen, M., Tommerdahl, M., Edden, R. A., & Mostofsky, S. H. (2017). Altered tactile sensitivity in children with attention-deficit hyperactivity disorder. *Journal of neurophysiology*, *118*(5), 2568-2578.
- Radmanović, M. B., & Burgić, S. S. (2020). Comorbidity in Children and Adolescents with ADHD. In *ADHD-From Etiology to Comorbidity*. IntechOpen.
- Rafalovich, A. (2015). ADHD: Three competing discourses. *The Palgrave handbook of child mental health: Discourse and conversation studies*, 79-95.
- Ramtekkar, U. P., Reiersen, A. M., Todorov, A. A., & Todd, R. D. (2010). Sex and age differences in attention-deficit/hyperactivity disorder symptoms and diagnoses: implications for DSM-V and ICD-11. *Journal of the American Academy of Child & Adolescent Psychiatry*, *49*(3), 217-228.
- Ranganath, A., & Jacob, S. N. (2016). Doping the mind: dopaminergic modulation of prefrontal cortical cognition. *The Neuroscientist*, *22*(6), 593-603.
- Rapaport, M. H., Nierenberg, A. A., Schettler, P. J., Kinkead, B., Cardoos, A., Walker, R., & Mischoulon, D. (2016). Inflammation as a predictive biomarker for response to omega-3 fatty acids in major depressive disorder: a proof-of-concept study. *Molecular psychiatry*, *21*(1), 71-79.
- Rathi, N., Riddell, L., & Worsley, A. (2017). Food and nutrition education in private Indian secondary schools. *Health Education*, *117*(2), 193-206.
- Reddy, P. C. O., Sairanganayakulu, G., Thippeswamy, M., Reddy, P. S., Reddy, M. K., & Sudhakar, C. (2008). Identification of stress-induced genes from the drought tolerant semi-arid legume crop horsegram (*Macrotyloma uniflorum* (Lam.) Verdc.) through analysis of subtracted expressed sequence tags. *Plant Science*, *175*(3), 372-384.
- Regier, D. A., Kuhl, E. A., & Kupfer, D. J. (2013). The DSM-5: Classification and criteria changes. *World psychiatry*, *12*(2), 92-98.
- Rehm, C. D., & Drewnowski, A. (2017). Replacing American snacks with tree nuts increases consumption of key nutrients among US children and adults: Results of an NHANES modeling study. *Nutrition journal*, *16*(1), 1-15.
- Rehman, A. (2014). Growth standards and charts: World health organization. *The Professional Medical Journal*, *21*(02), 232-239.
- Reiss, F., Meyrose, A. K., Otto, C., Lampert, T., Klasen, F., & Ravens-Sieberer, U. (2019). Socioeconomic status, stressful life situations and mental health problems in children and adolescents: Results of the German BELLA cohort-study. *PloS one*, *14*(3), e0213700.
- Richa, K., Laskar, S. K., Das, A., Choudhury, S., Hazarika, M., & Sonowal, S. (2020). Effect of black rice (*Oryza sativa* L.) flour on proximate composition, texture profile and microbiological qualities of chicken nuggets. *Journal of Entomology and Zoology Studies*, *8*(6), 412-416.
- Ríos-Hernández, A., Alda, J. A., Farran-Codina, A., Ferreira-García, E., & Izquierdo-Pulido, M. (2017). The Mediterranean Diet and ADHD in Children and Adolescents. *Pediatrics*, *139*(2), e20162027.

- Robberecht, H., Verlaet, A. A., Breynaert, A., De Bruyne, T., & Hermans, N. (2020). Magnesium, iron, zinc, copper and selenium status in attention-deficit/hyperactivity disorder (ADHD). *Molecules*, 25(19), 4440.
- Rohrer, J. M., Egloff, B., & Schmukle, S. C. (2015). Examining the effects of birth order on personality. *Proceedings of the National Academy of Sciences*, 112(46), 14224-14229.
- Rojo-Marticella, M., Arija, V., Alda, J. Á., Morales-Hidalgo, P., Esteban-Figuerola, P., & Canals, J. (2022). Do Children with Attention-Deficit/Hyperactivity Disorder Follow a Different Dietary Pattern than That of Their Control Peers?. *Nutrients*, 14(6), 1131.
- Rojo-Marticella, M., Arija, V., Alda, J. Á., Morales-Hidalgo, P., Esteban-Figuerola, P., & Canals, J. (2022). Do Children with Attention-Deficit/Hyperactivity Disorder Follow a Different Dietary Pattern than That of Their Control Peers?. *Nutrients*, 14(6), 1131.
- Rubab, S., Rizwani, G. H., Bahadur, S., Shah, M., Alsamadany, H., Alzahrani, Y., ... & Shah, A. A. (2020). Determination of the GC–MS analysis of seed oil and assessment of pharmacokinetics of leaf extract of *Camellia sinensis* L. *Journal of King Saud University-Science*, 32(7), 3138-3144.
- Sachan, A. K., Kumar, S., Kumari, K., & Singh, D. (2018). Medicinal uses of spices used in our traditional culture: Worldwide. *Journal of Medicinal Plants Studies*, 6(3), 116-122.
- Saini, S., Saxena, S., Samtiya, M., Puniya, M., & Dhewa, T. (2021). Potential of underutilized millets as Nutri-cereal: an overview. *Journal of Food Science and Technology*, 1-13.
- Salvat, H., Mohammadi, M. N., Molavi, P., Mostafavi, S. A., Rostami, R., & Salehinejad, M. A. (2022). Nutrient intake, dietary patterns, and anthropometric variables of children with ADHD in comparison to healthy controls: A case-control study. *BMC pediatrics*, 22(1), 1-9.
- Samadi, M., Moradi, S., Moradinazar, M., Mostafai, R., & Pasdar, Y. (2019). Dietary pattern in relation to the risk of Alzheimer's disease: a systematic review. *Neurological Sciences*, 40, 2031-2043.
- Samea, F., Soluki, S., Nejati, V., Zarei, M., Cortese, S., Eickhoff, S. B., ... & Eickhoff, C. R. (2019). Brain alterations in children/adolescents with ADHD revisited: A neuroimaging meta-analysis of 96 structural and functional studies. *Neuroscience & Biobehavioral Reviews*, 100, 1-8.
- Sanders, S., Doust, J., & Glasziou, P. (2015). A systematic review of studies comparing diagnostic clinical prediction rules with clinical judgment. *PLOS one*, 10(6), e0128233.
- Sasaki, M., Koplin, J. J., Dharmage, S. C., Field, M. J., Sawyer, S. M., McWilliam, V., ... & Allen, K. J. (2018). Prevalence of clinic-defined food allergy in early adolescence: The SchoolNuts study. *Journal of Allergy and Clinical Immunology*, 141(1), 391-398.
- Sayal, K., Prasad, V., Daley, D., Ford, T., & Coghill, D. (2018). ADHD in children and young people: prevalence, care pathways, and service provision. *The lancet psychiatry*, 5(2), 175-186.

- Sayas-Barberá, E., Valero-Asencio, M. M., Navarro Rodríguez-Vera, C., Fernández-López, J., Haros, C. M., Pérez-Álvarez, J. Á., & Viuda-Martos, M. (2021). Effect of different black quinoa fractions (seed, flour and wet-milling coproducts) upon quality of meat patties during freezing storage. *Foods*, *10*(12), 3080.
- Scarmeas, N., Anastasiou, C. A., & Yannakoulia, M. (2018). Nutrition and prevention of cognitive impairment. *The Lancet Neurology*, *17*(11), 1006-1015.
- Schmeer, K. K., & Yoon, A. J. (2016). Home sweet home? Home physical environment and inflammation in children. *Social science research*, *60*, 236-248.
- Sha'ari, N., Manaf, Z. A., Ahmad, M., & Rahman, F. N. A. (2017). Nutritional status and feeding problems in pediatric attention deficit-hyperactivity disorder. *Pediatrics International*, *59*(4), 408-415.
- Shaik, L., Kashyap, R., Thotamgari, S. R., Singh, R., & Khanna, S. (2020). Gut-brain axis and its neuro-psychiatric effects: A narrative review. *Cureus*, *12*(10).
- Shareghfarid, E., Sangsefidi, Z. S., Salehi-Abargouei, A., & Hosseinzadeh, M. (2020). Empirically derived dietary patterns and food groups intake in relation with Attention Deficit/Hyperactivity Disorder (ADHD): A systematic review and meta-analysis. *Clinical nutrition ESPEN*, *36*, 28-35.
- Sharma, R. (2017). Revised Kuppuswamy's socioeconomic status scale: explained and updated. *Indian pediatrics*, *54*, 867-870.
- Shorter, E. (2022). The history of nosology and the rise of the Diagnostic and Statistical Manual of Mental Disorders. *Dialogues in clinical neuroscience*.
- Singh, J. P., & Singh, A. K. (2017). A Study on Health Status of Urban School Children (7-18 Years): A School Based Cross Sectional Study. *National Journal of Community Medicine*, *8*(08), 442-446.
- Singh-Ackbarali, D., & Maharaj, R. (2014). Sensory evaluation as a tool in determining acceptability of innovative products developed by undergraduate students in food science and technology at the University of Trinidad and Tobago. *Journal of Curriculum and Teaching*, *3*(1), 10-27.
- Skalny, A. V., Mazaletskaya, A. L., Ajsuvakova, O. P., Bjørklund, G., Skalnaya, M. G., Chao, J. C. J., ... & Tinkov, A. A. (2020). Serum zinc, copper, zinc-to-copper ratio, and other essential elements and minerals in children with attention deficit/hyperactivity disorder (ADHD). *Journal of Trace Elements in Medicine and Biology*, *58*, 126445.
- Skalny, A. V., Mazaletskaya, A. L., Ajsuvakova, O. P., Bjørklund, G., Skalnaya, M. G., Chernova, L. N., ... & Tinkov, A. A. (2020). Magnesium status in children with attention-deficit/hyperactivity disorder and/or autism spectrum disorder. *Journal of the Korean Academy of Child and Adolescent Psychiatry*, *31*(1), 41.
- Slobodin, O., & Davidovitch, M. (2019). Gender differences in objective and subjective measures of ADHD among clinic-referred children. *Frontiers in human neuroscience*, 441.

- Smith, M. (2017). Hyperactive around the world? The history of ADHD in global perspective. *Social History of Medicine*, 30(4), 767-787.
- Sonneville, K. R., Calzo, J. P., Horton, N. J., Field, A. E., Crosby, R. D., Solmi, F., & Micali, N. (2015). Childhood hyperactivity/inattention and eating disturbances predict binge eating in adolescence. *Psychological medicine*, 45(12), 2511-2520.
- Sourander, A., Silwal, S., Upadhyaya, S., Surcel, H. M., Hinkka-Yli-Salomäki, S., McKeague, I. W., ... & Brown, A. S. (2021). Maternal serum Vitamin B12 and offspring attention-deficit/hyperactivity disorder (ADHD). *European child & adolescent psychiatry*, 30, 1449-1462.
- Spencer, S. J., Korosi, A., Layé, S., Shukitt-Hale, B., & Barrientos, R. M. (2017). Food for thought: how nutrition impacts cognition and emotion. *npj Science of Food*, 1(1), 7.
- Starck, M., Grünwald, J., & Schlarb, A. A. (2016). Occurrence of ADHD in parents of ADHD children in a clinical sample. *Neuropsychiatric disease and treatment*, 581-588.
- Stobnicka-Kupiec, A. (2020). Water Damage in Buildings and Associated Microbiological Contamination. In *Microbiological Corrosion of Buildings* (pp. 1-10). CRC Press.
- Sudha, M. L., Indumathi, K., Sumanth, M. S., Rajarathnam, S., & Shashirekha, M. N. (2015). Mango pulp fibre waste: characterization and utilization as a bakery product ingredient. *Journal of Food Measurement and Characterization*, 9, 382-388.
- Sukandar, D., Khomsan, A., Anwar, F., Riyadi, H., & Mudjajanto, E. S. (2015). Nutrition knowledge, attitude, and practice of mothers and children nutritional status improved after five months nutrition education intervention. *Int J Sci Basic Appl Res*, 23(2), 424-42.
- Sultana, N., Afroz, S., Tomalika, N., Momtaz, H., & Kabir, M. H. (2019). Prevalence of childhood obesity and undernutrition among urban school children in Bangladesh. *Journal of biosocial science*, 51(2), 244-253.
- Swansburg, R., Hai, T., MacMaster, F. P., & Lemay, J. F. (2021). Impact of COVID-19 on lifestyle habits and mental health symptoms in children with attention-deficit/hyperactivity disorder in Canada. *Paediatrics & Child Health*, 26(5), e199-e207.
- Taki, S., Russell, C. G., Wen, L. M., Laws, R. A., Campbell, K., Xu, H., & Denney-Wilson, E. (2019). Consumer engagement in mobile application (app) interventions focused on supporting infant feeding practices for early prevention of childhood obesity. *Frontiers in Public Health*, 7, 60.
- Taleb, H., Maddocks, S. E., Morris, R. K., & Kanekanian, A. D. (2016). Chemical characterisation and the anti-inflammatory, anti-angiogenic and antibacterial properties of date fruit (*Phoenix dactylifera* L.). *Journal of ethnopharmacology*, 194, 457-468.
- Tang, Y., & Tsao, R. (2017). Phytochemicals in quinoa and amaranth grains and their antioxidant, anti-inflammatory, and potential health beneficial effects: a review. *Molecular Nutrition & Food Research*, 61(7), 1600767.

- Taylor, M. R., Chuang, C., Carrasco, K. D., Nagatomo, S., & Rucklidge, J. J. (2018). Dietary and micronutrient treatments for children with neurodevelopment disorders. *Current Developmental Disorders Reports*, 5, 243-252.
- Tefera, E., Mohammed, J., & Mitiku, H. (2017). Nutritional status of school children in Babile Town, Eastern Ethiopia. *East African Journal of Health and Biomedical Sciences*, 1(2), 1-10.
- Thapar, A., Cooper, M., Eyre, O., & Langley, K. (2013). Practitioner review: what have we learnt about the causes of ADHD?. *Journal of Child Psychology and Psychiatry*, 54(1), 3-16.
- Thejaswini B.N, Divya Ramesh and Jamuna Prakash (2017). Nutritional Composition and Sensory Quality of Cookies Incorporated with Little Millet (*Panicum Milliaræ*). *International Journal of Food, Nutrition and Dietetics*. 5(1). 13-18.
- Theoharides, T. C., Stewart, J. M., Hatzigelaki, E., & Kolaitis, G. (2015). Brain “fog,” inflammation and obesity: key aspects of neuropsychiatric disorders improved by luteolin. *Frontiers in neuroscience*, 9, 225.
- Thomas, R., Sanders, S., Doust, J., Beller, E., & Glasziou, P. (2015). Prevalence of attention-deficit/hyperactivity disorder: a systematic review and meta-analysis. *Pediatrics*, 135(4), e994-e1001.
- Tong, L., Shi, H., & Li, X. (2017). Associations among ADHD, abnormal eating and overweight in a non-clinical sample of Asian children. *Scientific reports*, 7(1), 1-8.
- Tørris, C., Småstuen, M. C., & Molin, M. (2018). Nutrients in fish and possible associations with cardiovascular disease risk factors in metabolic syndrome. *Nutrients*, 10(7), 952.
- Torvik, F. A., Eilertsen, E. M., McAdams, T. A., Gustavson, K., Zachrisson, H. D., Brandlistuen, R., ... & Ystrom, E. (2020). Mechanisms linking parental educational attainment with child ADHD, depression, and academic problems: a study of extended families in The Norwegian Mother, Father and Child Cohort Study. *Journal of Child Psychology and Psychiatry*, 61(9), 1009-1018.
- Truzzi, C., Annibaldi, A., Antonucci, M., Scarponi, G., & Illuminati, S. (2018). Gas chromatography–mass spectrometry analysis on effects of thermal shock on the fatty acid composition of the gills of the Antarctic teleost, *Trematomus bernacchii*. *Environmental Chemistry*, 15(7), 424-435.
- Tsai, F. J., Tseng, W. L., Yang, L. K., & Gau, S. S. F. (2019). Psychiatric comorbid patterns in adults with attention-deficit hyperactivity disorder: Treatment effect and subtypes. *PLoS One*, 14(2), e0211873.
- Tseng, P. T., Cheng, Y. S., Yen, C. F., Chen, Y. W., Stubbs, B., Whiteley, P., ... & Lin, P. Y. (2018). Peripheral iron levels in children with attention-deficit hyperactivity disorder: a systematic review and meta-analysis. *Scientific reports*, 8(1), 1-11.
- Tso, W. W., Wong, R. S., Tung, K. T., Rao, N., Fu, K. W., Yam, J. C., ... & Lp, P. (2020). Vulnerability and resilience in children during the COVID-19 pandemic. *European child & adolescent psychiatry*, 1-16.

- Tucci, M., Marino, M., Martini, D., Porrini, M., Riso, P., & Del Bo', C. (2022). Plant-based foods and vascular function: a systematic review of dietary intervention trials in older subjects and hypothesized mechanisms of action. *Nutrients*, *14*(13), 2615.
- Tucker, I. (2017). Autism, Nutrition, ADHD, DPP-IV Resources, Amino Acids Resources. *Autism*.
- Unal, D., Çelebi, F., Bildik, H. N., Koyuncu, A., & Karahan, S. (2019). Vitamin B12 and haemoglobin levels may be related with ADHD symptoms: a study in Turkish children with ADHD. *Psychiatry and Clinical Psychopharmacology*, *29*(4), 515-519.
- UNICEF. (2019). The State of The World's Children 2019-Growing Well in a Changing World. *New York: UNICEF*.
- Van der Kaap-Deeder, J., Vansteenkiste, M., Soenens, B., & Mabbe, E. (2017). Children's daily well-being: The role of mothers', teachers', and siblings' autonomy support and psychological control. *Developmental psychology*, *53*(2), 237.
- Venkata, J. A., & Panicker, A. S. (2013). Prevalence of attention deficit hyperactivity disorder in primary school children. *Indian journal of psychiatry*, *55*(4), 338.
- Venkatesh, C., Ravikumar, T., Andal, A., & Virudhagirinathan, B. S. (2012). Attention-deficit/hyperactivity disorder in children: clinical profile and co-morbidity. *Indian Journal of Psychological Medicine*, *34*(1), 34-38.
- Vieira, E. D., Gomes, A. M., Gil, A. M., & Vasconcelos, M. W. (2021). Pulses' benefits in children's diets: a narrative review. *Journal of Obesity and Chronic Diseases*, *5*(1), 13-22.
- Viktorinova, A., Ursinyova, M., Trebaticka, J., Uhnakova, I., Durackova, Z., & Masanova, V. (2016). Changed plasma levels of zinc and copper to zinc ratio and their possible associations with parent-and teacher-rated symptoms in children with attention-deficit hyperactivity disorder. *Biological trace element research*, *169*, 1-7.
- Villagomez, A., & Ramtekkar, U. (2014). Iron, magnesium, vitamin D, and zinc deficiencies in children presenting with symptoms of attention-deficit/hyperactivity disorder. *Children*, *1*(3), 261-279.
- Visser, J. C., Rommelse, N. N., Greven, C. U., & Buitelaar, J. K. (2016). Autism spectrum disorder and attention-deficit/hyperactivity disorder in early childhood: A review of unique and shared characteristics and developmental antecedents. *Neuroscience & Biobehavioral Reviews*, *65*, 229-263.
- Visser, S. N., Bitsko, R. H., Danielson, M. L., Perou, R., & Blumberg, S. J. (2010). Increasing prevalence of parent-reported attention-deficit/hyperactivity disorder among children—United States, 2003 and 2007. *Morbidity and mortality weekly report*, *59*(44), 1439-1443.
- Volger, S., Sheng, X., Tong, L. M., Zhao, D., Fan, T., Zhang, F., ... & Yao, M. (2017). Nutrient intake and dietary patterns in children 2.5-5 years of age with picky eating behaviours and low weight-for-height. *Asia Pacific Journal of Clinical Nutrition*, *26*(1), 104-109.

- Wakschlag, L. S., Perlman, S. B., Blair, R. J., Leibenluft, E., Briggs-Gowan, M. J., & Pine, D. S. (2018). The neurodevelopmental basis of early childhood disruptive behavior: Irritable and callous phenotypes as exemplars. *American journal of psychiatry*, *175*(2), 114-130.
- Walkup, J. T., Stossel, L., & Rendleman, R. (2013). Beyond rising rates: personalized medicine and public health approaches to the diagnosis and treatment of attention-deficit/hyperactivity disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, *53*(1), 14-16.
- Wang, C., Pan, R., Wan, X., Tan, Y., Xu, L., Ho, C. S., & Ho, R. C. (2020). Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *International journal of environmental research and public health*, *17*(5), 1729.
- Wang, L. J., Yu, Y. H., Fu, M. L., Yeh, W. T., Hsu, J. L., Yang, Y. H., ... & Pan, W. H. (2018). Attention deficit–hyperactivity disorder is associated with allergic symptoms and low levels of hemoglobin and serotonin. *Scientific reports*, *8*(1), 1-7.
- Wani R. T. (2019). Socioeconomic status scales-modified Kuppuswamy and Udai Pareekh's scale updated for 2019. *Journal of family medicine and primary care*, *8*(6), 1846–1849.
- Waseem, M., & Parvez, S. (2016). Neuroprotective activities of curcumin and quercetin with potential relevance to mitochondrial dysfunction induced by oxaliplatin. *Protoplasma*, *253*, 417-430.
- Weiss, M. D., Craig, S. G., Davies, G., Schibuk, L., & Stein, M. (2015). New research on the complex interaction of sleep and ADHD. *Current Sleep Medicine Reports*, *1*, 114-121.
- Widiger, T. A., Costa, P. T., & American Psychological Association (Eds.). (2013). *Personality disorders and the five-factor model of personality*. Washington, DC: American Psychological Association.
- Wiercigroch, E., Szafraniec, E., Czamara, K., Pacia, M. Z., Majzner, K., Kochan, K., ... & Malek, K. (2017). Raman and infrared spectroscopy of carbohydrates: A review. *Spectrochimica Acta Part A: Molecular and Biomolecular Spectroscopy*, *185*, 317-335.
- Willcutt, E. G. (2012). The prevalence of DSM-IV attention-deficit/hyperactivity disorder: a meta-analytic review. *Neurotherapeutics*, *9*(3), 490-499.
- Williamson, B. (2016). Digital education governance: data visualization, predictive analytics, and ‘real-time’ policy instruments. *Journal of education policy*, *31*(2), 123-141.
- Williamson, B., Eynon, R., & Potter, J. (2020). Pandemic politics, pedagogies and practices: digital technologies and distance education during the coronavirus emergency. *Learning, Media and Technology*, *45*(2), 107-114.
- Wilson, J. H., & Joye, S. W. (2016). *Research methods and statistics: An integrated approach*. Sage Publications.
- Woo, H. D., Kim, D. W., Hong, Y. S., Kim, Y. M., Seo, J. H., Choe, B. M., ... & Kim, J. (2014). Dietary patterns in children with attention deficit/hyperactivity disorder (ADHD). *Nutrients*, *6*(4), 1539-1553.

- World Health Organization. (2018). Nurturing care for early childhood development: a framework for helping children survive and thrive to transform health and human potential.
- World Health Organization. (2019). *The state of food security and nutrition in the world 2019: safeguarding against economic slowdowns and downturns* (Vol. 2019). Food & Agriculture Org.
- World Health Organization. (2019). *UNICEF-WHO low birthweight estimates: levels and trends 2000-2015* (No. WHO/NMH/NHD/19.21). World Health Organization.
- Wozniak, J. R., Riley, E. P., & Charness, M. E. (2019). Clinical presentation, diagnosis, and management of fetal alcohol spectrum disorder. *The Lancet Neurology*, *18*(8), 760-770.
- Yadav, S. K., Bhat, A. A., Hashem, S., Nisar, S., Kamal, M., Syed, N., ... & Haris, M. (2021). Genetic variations influence brain changes in patients with attention-deficit hyperactivity disorder. *Translational Psychiatry*, *11*(1), 349.
- Yang, X., Zhang, Y., Xu, H., Luo, X., Yu, J., Liu, J., & Chang, R. C. C. (2016). Neuroprotection of coenzyme Q10 in neurodegenerative diseases. *Current topics in medicinal chemistry*, *16*(8), 858-866.
- Yaquub, M., & Ghezzi, P. (2015). Adding dimensions to the analysis of the quality of health information of websites returned by Google: cluster analysis identifies patterns of websites according to their classification and the type of intervention described. *Frontiers in public health*, *3*, 204.
- Yorgidis, E., Beiner, L., Blazynski, N., Schneider-Momm, K., Clement, H. W., Rauh, R., & Fleischhaker, C. (2021). Individual behavioral reactions in the context of food sensitivities in children with attention-deficit/hyperactivity disorder before and after an oligoantigenic diet. *Nutrients*, *13*(8), 2598.
- Yu, C. J., Du, J. C., Chiou, H. C., Feng, C. C., Chung, M. Y., Yang, W., ... & Chen, M. L. (2016). Sugar-sweetened beverage consumption is adversely associated with childhood attention deficit/hyperactivity disorder. *International journal of environmental research and public health*, *13*(7), 678.
- Yüce, M., Uçar, F., & Say, G. N. (2015). Comorbid Conditions in Child and Adolescent Patients Diagnosed with Attention Deficit/Hyperactivity Disorder. In *ADHD-New Directions in Diagnosis and Treatment*. IntechOpen.
- Zain, N. H. M., Johari, S. N., Aziz, S. R. A., Teo, N. H. I., Ishak, N. H., & Othman, Z. (2021). Winning the needs of the Gen Z: Gamified health awareness campaign in defeating COVID-19 pandemic. *Procedia Computer Science*, *179*, 974-981.
- Zarnowiecki, D., Mauch, C. E., Middleton, G., Matwiejczyk, L., Watson, W. L., Dibbs, J., ... & Golley, R. K. (2020). A systematic evaluation of digital nutrition promotion websites and apps for supporting parents to influence children's nutrition. *International Journal of Behavioral Nutrition and Physical Activity*, *17*, 1-19.

- Zhang, C. R., Aldosari, S. A., Vidyasagar, P. S., Shukla, P., & Nair, M. G. (2017). Health-benefits of date fruits produced in Saudi Arabia based on in vitro antioxidant, anti-inflammatory and human tumor cell proliferation inhibitory assays. *Journal of the Saudi Society of Agricultural Sciences*, 16(3), 287-293.
- Zhou, L., Chen, L., Li, X., Li, T., Dong, Z., & Wang, Y. T. (2019). Food allergy induces alteration in brain inflammatory status and cognitive impairments. *Behavioural brain research*, 364, 374-382.
- Zhou, X., Reynolds, C. R., Zhu, J., Kamphaus, R. W., & Zhang, O. (2018). Evidence-based assessment of ADHD diagnosis in children and adolescents. *Applied Neuropsychology: Child*, 7(2), 150-156.
- Zipp, A., & Eissing, G. (2019). Studies on the influence of breakfast on the mental performance of school children and adolescents. *Journal of Public Health*, 27, 103-110.

### **Websites**

- CDC Growth Charts: United States. Centers for Disease Control and Prevention [Internet]. 2009
- Center for Disease Control and Prevention, (2010). Increasing prevalence of parent- reported attention-deficit/hyperactivity disorder among children - United States, 2003 and 2007. *Morbidity and Mortality Weekly Report (MMWR)*, 59(44):1439-43.
- Center for Disease Control and Prevention, Key findings: Trends in the Parent – Report of HealthCare Provider-Diagnosis and Medication Treatment for ADHD: United States, 2003 -2011. Retrieved from <http://www.cdc.gov/ncbddd/adhd/features/key-findings-adhd72013.html>
- Centers for Disease Control and Prevention (CDC). 2020a. Percentile data files with LMS values Digital intervention (2017) [https://en.wikipedia.org/wiki/Digital\\_health#cite\\_note-ehj-4](https://en.wikipedia.org/wiki/Digital_health#cite_note-ehj-4)
- FAO. (2018). *Dietary Assessment: A resource guide to method selection and application in low resource settings*. Rome. Available at: <http://www.fao.org/3/I9940EN/i9940en.pdf> assessed on: 1.10.21
- FDA .(2019). Statement on new steps to advance digital health policies that encourage innovation and enable efficient and modern regulatory oversight, ,Available at : <https://www.fda.gov/news-events/press-announcements/statement-new-steps-advance-digital-health-policies-encourage-innovation-and-enable-efficient-and>. Accessed 25 Nov. 2021
- Govt, N. H. (n.d.). *A FEW INDIAN SEED SPICES IN NATURE CURE OF SOME OF THE COMMON AILMENTS*. <https://www.researchgate.net/publication/352477704>
- Graham, George, "Behaviorism", *The Stanford Encyclopedia of Philosophy* (Spring 2019 Edition), Edward N. Zalta (ed.), URL = <<https://plato.stanford.edu/archives/spr2019/entries/behaviorism/>>.
- ICMR (2020), [https://www.nin.res.in/nutrition2020/RDA\\_short\\_report.pdf](https://www.nin.res.in/nutrition2020/RDA_short_report.pdf).

World Health Organization. ICD-11 for Mortality and Morbidity Statistics. Available online: <https://icd.who.int/browse11/lm/en#/http%3a%2f%2fid.who.int%2fid%2fentity%2f1207960454> 1/2/2020

World Health Organization. 2013. [2017-11-13]. NCD Global Monitoring Framework [nmh/global\\_monitoring\\_framework/en/](http://www.who.int/nmh/global_monitoring_framework/en/) *webcite*

# Appendices

## Appendix – 1

### Ethical Institutional Human Ethics

#### INSTITUTIONAL HUMAN ETHICS COMMITTEE



### *Avinashilingam*

Institute for Home Science and Higher Education for Women  
(Deemed to be University under Category 'A' by MHRD, Estd. u/s 3  
of UGC Act 1956) Re-accredited with 'A+' Grade by NAAC.  
Recognised by UGC Under Section 12 B  
Coimbatore-641 043, Tamil Nadu, India

19<sup>th</sup> November, 2021

#### **Chairman**

Dr. Sudha Ramalingam  
Director-Research & Innovation,  
Professor-Community Medicine,  
PSG Institute of Medical Sciences  
& Research, Coimbatore

#### **Member Secretary**

Dr.S.Uma Mageshwari  
Professor and Head,  
Department of Food Service  
Management & Dietetics

#### **Members**

Mr. K.Arulmoli (Legal Expert)  
Dr.Subhashini K. Sripathi  
Dr.A.Saraswathy (Medical Officer)  
Ms.D.Kavitha  
Dr.A.R.Sudamani Ramasamy  
Dr.G.Victoria Naomi  
Dr. Judith Justin  
Dr.Anitha Subash

To  
Ms. Soundariya S  
Department of Food Science and Nutrition  
Avinashilingam Institute for Home Science and  
Higher Education for Women  
Coimbatore – 641 043

Dear Soundariya S,

Ref: Your proposal No. IHEC/20-21/FSN/27 entitled  
“Digital Technology assisted Nutritional Support for ADHD Children  
during Covid-19 Pandemic” submitted for approval of IHEC.

The Institutional Human Ethics Committee of our University  
hereby grants approval to your research proposal No. IHEC/20-  
21/FSN/27 entitled “Digital Technology assisted Nutritional Support  
for ADHD Children during Covid-19 Pandemic” submitted by you.  
The Approval number for the same is AUW/IHEC/FSN-20-  
21/XPD-27.

We wish you all the best in your research endeavours.

Regards,

*S. Uma Mageshwari*  
Dr.S.Uma Mageshwari  
Member Secretary



## Appendix - 2

### Permission letter



**Avinashilingam**  
Institute For Home Science And Higher Education For Women  
**University**  
(Estd.u/s 3 of UGC Act 1956)  
(Deemed University under Category 'A' by MHRD)  
Coimbatore – 641 043, Tamil Nadu, India  
*Re-accredited with 'A' Grade by NAAC*

**Dr. C.A. Kalpana.** M.Sc., B.Ed., M.Phil., Ph.D  
**Associate Professor**  
**Department of Food Science and Nutrition**  
Mobile : 94437 54269, 99443 15651  
Phone : 0091-422-244024 (Ext 256)  
E-mail : cakalpana272@gmail.com

25.1.2020

To  
Lalitha Ramanujan  
Alpha to Omega Learning Centre  
Chennai - 608 103

Respected Madam/Sir

As part of the PhD work of my advisee Ms. Soundariya on the topic "Nutritional Intervention on the symptomatology in the Attention Deficit Hyperactivity Disorder among children", the research regimes the following

1. Identification of children with ADHD (4-12 years)
2. Collection of data pertaining to socio-economic and dietary pattern through interview schedule. (Parents)
3. Assessment of Nutritional status- Anthropometric measurements, height and weight, Clinical Examination, Diet history- recall method.
4. Nutrition education for parents and diet modification.

In this regard, I request you to kindly permit her to conduct the above mentioned in your school. I assure you that she will neither draw blood samples nor provide any food supplements to the children during the course of her work. Kindly consider.

Thanking you

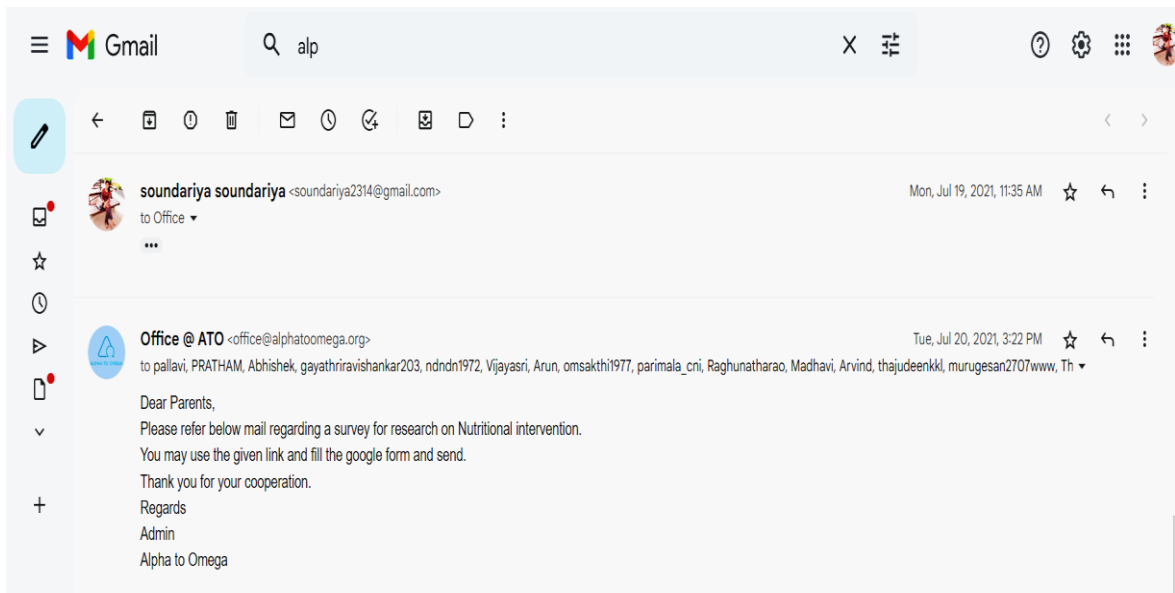
Yours faithfully

*(Signature)*  
25/1/2020  
(C.A.KALPANA)

*L. Ramanya*  
Please confirm with mail

### Appendix - 3

#### Online Permission letter



## Appendix - 4

Interview Schedule for children with hyperactivity, attention difficulty,  
and behavioural problemsA. **DEMOGRAPHIC PROFILE OF THE CHILD**

1. Age of the child: \_\_\_\_\_
2. Gender:  Male  Female
7. Family type:  Joint  Nuclear
8. Number of family members:  2  3  4  5  >6
9. Ordinal position of the child:  1  2  3  4  5
10. Religion: \_\_\_\_\_
11. Mother tongue: \_\_\_\_\_
12. No. of languages spoken at home: \_\_\_\_\_
13. Family income per month  ₹  ₹

S.No.	Name of the family member	Age and Educational qualifications	Relationship with the child	Working / Non-working	Occupation
1					
2					
3					
4					
5					

21. Did you take any supplements during this pregnancy?  Yes  No
22. Did you consume any special foods during this pregnancy?  Yes  No
23. Did you have any major injuries during this pregnancy?  Yes  No  
If yes, explain \_\_\_\_\_
24. Describe your lifestyle during pregnancy.
- a. Sedentary
- b. Moderately active
- c. Very active
25. Are you allergic to any foods / food supplements?  Yes  No
26. What was the mode of delivery?
- a. Normal
- b. Instrumental delivery

- c. C-section
27. The child was  Preterm  Full term
28. Did you breast feed the child?  Yes  No Duration of breast feeding? \_\_\_\_\_

**C. FATHER'S HEALTH PROFILE**

29. Educational qualifications: \_\_\_\_\_  
Age at the time of marriage: \_\_\_\_\_years
30. Any major health problems? \_\_\_\_\_
31. How do you describe father's personality?
- a. Very calm
- b. Stable
- c. Aggressive
32. Does the father smoke?  Yes  No
33. Does the father consume alcohol?  Yes  No
- a. Daily
- b. Once a week
- c. More than 3 times a week
- d. Bi monthly / Monthly

**D. CHILD'S HEALTH PROFILE**

34. Blood group of the child? \_\_\_\_\_
35. Any food allergy?  Yes  No  
If yes, specify \_\_\_\_\_  
Symptoms \_\_\_\_\_
36. Any sensitivity to certain smells like hair sprays, detergents, perfumes, noises? Yes  No  If yes, please specify \_\_\_\_\_
37. When the child is hungry, he/she is... .. (Tick whichever applicable)
- a. Having headaches
- b. Dizzy
- c. Moody
- d. Tired
- e. Shaky
- f. Irritable
- g. Hyperactive
- h. Normal

38. Difficulty in going to bed?  Yes  No
39. Did the child have/had any health problems?  Yes  No  
 No If yes, specify \_\_\_\_\_  
 Age at the onset \_\_
40. Did the child have any major injuries?  Yes  No  
 No If yes, specify \_\_\_\_\_  
 Age at that time \_\_
41. Any surgeries in the past?  Yes  No  
 If yes, specify \_\_\_\_\_  
 Age \_\_
42. Diagnosed of attention deficit/hyperactivity \_\_\_\_\_ years
43. Name of the comorbid conditions diagnosed along with ADHD  
 \_\_\_\_\_
44. Medications for ADHD/ comorbid conditions  
 a. \_\_\_\_\_  
 b. \_\_\_\_\_  
 c. \_\_\_\_\_  
 d. \_\_\_\_\_ Duration \_\_\_\_\_
45. What are the other interventions that the child has undergone for ADHD/ADD?  
Duration  
 a. Special education \_\_\_\_\_  
 b. Occupational therapy \_\_\_\_\_  
 c. Physiotherapy \_\_\_\_\_  
 d. Yoga \_\_\_\_\_  
 e. Any other therapy (Pl specify) \_\_\_\_\_
62. Speech  
 a. Before 2 years  
 b. After 2 years

**F. ANTHROMETRIC PROFILE**

63. Height of the child: \_\_\_\_\_ cms
64. Weight of the child: \_\_\_\_\_ kgs

65. BMI percentile \_\_\_\_\_

**G. DIETARY PATTERN**

66. Child is a

- a. Vegetarian
- b. Ova - vegetarian
- c. Non - vegetarian

67. Dietary pattern (3-days recall)

	Early morning	Morning	Mid-morning	Lunch	Evening	Dinner	Bed time
Day 1							
Day 2							
Day 3							

68. Does the child frequently skip any of his meals?  Yes  No

If yes, which of these?  Milk  Breakfast   
 Lunch  Dinner

69. Are you aware about the following diets?

- a. Sugar free / low sugar diet
- b. Feingold diet
- c. Caesin free diet
- d. Gluten free diet

70. Food frequency questionnaire

Food items	Daily	Weekly	Biweekly	Monthly	Rarely
Cereals like Rice, Wheat, Bread, Ragi, Corn					
Pulses like Red gram, Bengal gram					
Vegetables Beans, Lady's finger, Drumstick					
Green leafy vegetables					
Roots and tubers like Onion, Potato, Carrot					
Fruits like Apple, Guava, Papaya					
Non vegetarian foods like Egg, Chicken, Fish					
Milk & milk products like Buttermilk, Curd, Butter					
Sugar & Jaggery					
Oils like Palm oil, Ghee					

Nuts like Groundnuts, Almonds, Coconuts					
Miscellaneous foods					
Mixture, murukku etc					
Fried snacks (Bhajji, Samosa)					
Sweets					
Eating out					
Tea / coffee					
Processed foods:					
- Biscuits					
- Processed chips, Instant noodles					
- Soft drinks, flavoured drinks					
- Ice creams					
- Candies, lollypops					
- Chocolates					
- Artificially coloured / flavoured foods (e.g. cotton candy, flavoured milk, kesari, chicken 65 etc)					

**H. MORBIDITY PATTERN OF THE CHILD**

71. State the problems that the child has suffered in the past 6 months.

Problems	Frequency		
	Frequently	Rarely	Not at all
Fever and cold			
Intestinal infestation			
Abdominal pain			
Common ear, nose and throat problems			
Common eye problems			
Common skin disorders			
Respiratory diseases			
Heart diseases			
Genito urinary problems			
CNS disorders			
Others:			

**I. ACTIVITY AND LEISURE PATTERN OF THE CHILD**

72. Does your child participate in any form of physical exercise?  Yes

No If yes, specify \_\_\_\_\_

If yes, duration?  6-7 days/week  3 days/week  
 1-2 days/week  1-2 days/week

73. What are the child’s favourite leisure time activities? (Tick whichever is applicable)

S.no.	Activities	Yes / No	Duration
1	Focus & Concentration skills Therapy		
2	Watching Tv		
3	Others		
4	Computer games /Mobile		
5	Indoor games		
6	Outdoor games		
7	Dancing		
8	Music		

**J. DSM-V- Criteria**

I. Either A or B:

A. Six or more of the following symptoms of inattention have been present for at least 6 months to a point that is inappropriate for developmental level:

**Inattention**

1. Often does not give close attention to details or makes careless mistakes in schoolwork, work, or other activities.
2. Often has trouble keeping attention on tasks or play activities.
3. Often does not seem to listen when spoken to directly.
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (not due to oppositional behavior or failure to understand instructions).
5. Often has trouble organizing activities.
6. Often avoids, dislikes, or doesn't want to do things that take a lot of mental effort for a long period of time (such as schoolwork or homework).
7. Often loses things needed for tasks and activities (e.g. toys, school assignments, pencils, books, or tools).

8. Is often easily distracted.
9. Is often forgetful in daily activities.

**B. Six or more of the following symptoms of hyperactivity-impulsivity have been present for at least 6 months to an extent that is disruptive and inappropriate for developmental level:**

**Hyperactivity**

1. Often fidgets with hands or feet or squirms in seat when sitting still is expected.
2. Often gets up from seat when remaining in seat is expected.
3. Often excessively runs about or climbs when and where it is not appropriate (adolescents or adults may feel very restless).
4. Often has trouble playing or doing leisure activities quietly.
5. Is often "on the go" or often acts as if "driven by a motor".
6. Often talks excessively.

**Impulsivity**

7. Often blurts out answers before questions have been finished.
8. Often has trouble waiting one's turn.
9. Often interrupts or intrudes on others (e.g., butts into conversations or games).

**Clinical Examination Schedule**

S.No	Clinical Examination	Signs
1.	Loss of appetite	
2.	Oedema	
3.	Muscle wasting/Apathy/Irritability	
4.	Hair changes- loss of luster/dicoloured/Dandruff	
5.	Skin changes dry and rough /Hyperkeratosis	
6.	Eyes-pale/dull	
7.	Angular stomatitis	
8.	Dermatitis	
9.	Bleeding gums	
10.	Night blindness/Bitot's spots/Conjunctival xerosis	
11.	Dental Caries/Teeth discolouration	
12.	Tongue-Red/Pigmentation/Ulceration	

---

## Appendix – 5

### KAP Questionnaire

#### Knowledge

1. What are the signs of ADHD?
  - a. Hyperactive b. Laziness c. Stressed
2. Do you think nutrition causes child symptoms?
  - a. Yes b. No
3. Do you think Iron and Zinc rich foods improve ADHD symptoms?
  - a. Yes b. No
4. Do you think Omega 3 fatty acids-rich foods improve ADHD symptoms?
  - b. Yes b. No
5. Do you think Magnesium rich foods improve ADHD symptoms?
  - c. Yes b. No
6. Is it essential to add fish to the diet of your child?
  - a. Yes b. No
7. What does Quinoa Contain/
  - a. Zinc b. Fat c. Protein d. do not know
8. Which among the following is rich in omega -3 fatty acids?
  - a. Amaranth b. Rice c. Ragi
9. Which among the following increases the symptoms of ADHD?
  - a. Green Leafy vegetable b. Refined flour c. Fruits
10. Do you know about the Elimination diet, which is used to treat ADHD symptoms?
  - a. Yes b. No

#### Attitude

1. What do you think about using nutrition games for ADHD?
  - a. Effective b. Not effective
2. Do you think nutrition modification can bring improvement in children with ADHD symptoms?
  - a. Yes b. No
3. Do you believe specially developed snacks will benefit children with ADHD symptoms?
  - a. Yes b. No
4. How confident do you feel in planning food for your children with ADHD symptoms?
  - a. Confident b. Not Confident
5. Are you willing to learn about nutrition requirement for children with ADHD symptoms?
  - a. Willing b. Unwilling
6. What is your attitude towards including quinoa and amaranth seeds in the diet for snacks?

- 
- a. Willing b. Unwilling
  7. Fish is a rich source of \_\_\_\_\_
    - a. Omega 3 -fatty acids b. Vitamin C c. Vitamin B<sub>1</sub>
  8. Do you think that diet modification can be a substitute to behavioural therapy?
    - a. Yes b. No
  9. Is processed and preserved foods good for child with ADHD symptoms?
    - a. Yes b. No
  10. Do you think parent- child relationship can bring positive changes in children?
    - a. Yes b. No

**Practices**

1. How often you give Amaranth leaves and Curry leaves based food products to your child?
  - a. Regularly-1
  - b. Sometimes-2
  - c. Rarely-3
2. How often you give nuts to your child?
  - a. Regularly-1
  - b. Sometimes-2
  - c. Rarely-3
3. How often your child consumes Horse gram and Quinoa?
  - a. Regularly-1
  - b. Sometimes-2
  - c. Rarely-3
4. How many servings of vegetables your child takes in a day?
  - a. Less than 1 SERVINGS-(3)
  - b. 1-3- SERVINGS - (2)
  - c. More than 3 SERVINGS – (1)
5. How often your child consumes Black gram dhal?
  - a. Regularly-1
  - b. Sometimes-2
  - c. Rarely-3
6. How often your child consumes Omega3 rich seeds?
  - a. Regularly-1
  - b. Sometimes-2
  - c. Rarely-3
7. How often your child consumes Fish?
  - a. Regularly-2
  - b. Sometimes-1
  - c. Rarely-3
8. How often your child consumes processed foods like chips, fried snacks?
  - a. Regularly-3
  - b. Sometimes-2
  - c. Rarely-1

9. How often your child consumes artificially coloured and flavoured foods like-toffees, snacks, flavoured milk, coloured sweets etc.?
  - a. Regularly-3
  - b. Sometimes-2
  - c. Rarely-1
10. How often your child consumes tea, coffee, carbonated drinks?
  - a. Regularly-3
  - b. Sometimes-2
  - c. Rarely-1

### Appendix – 6

#### Five point hedonic scale - Score Card

#### *SENSORY EVALUATION*

Name:

Date:

Score card based on Five point hedonic scale

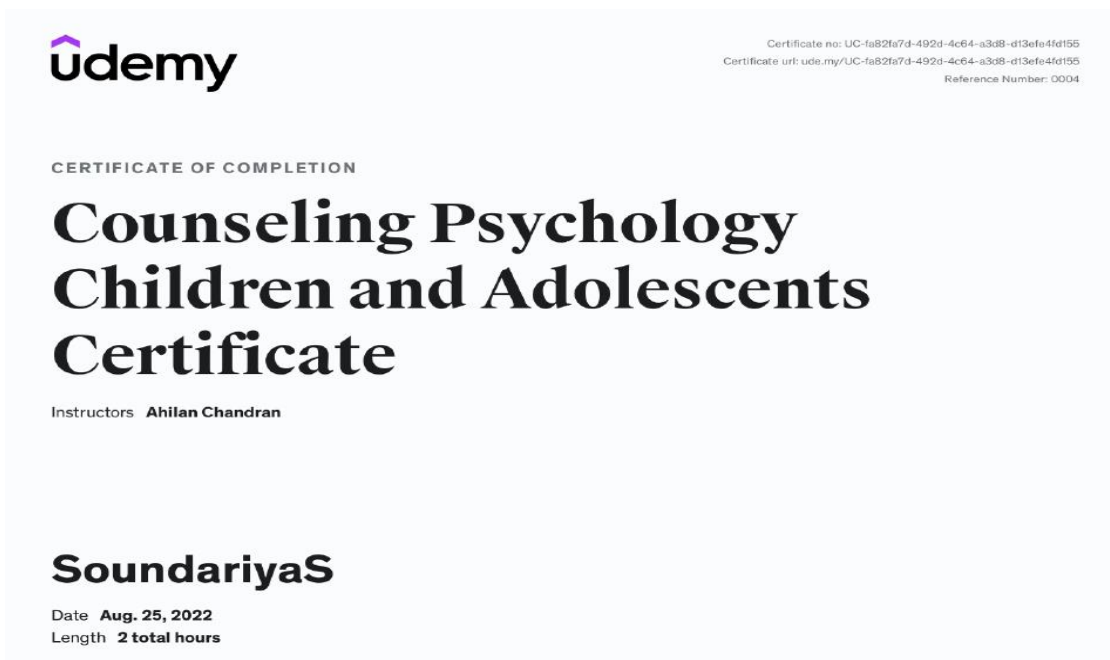
1	Like very much
2	Like slightly
3	Neither like nor dislike
4	Dislike slightly
5	Dislike very much

S.no	Product Code	Appearance	Color	Flavor	Taste	Texture	Overall acceptability

Signature

Appendix – 7

UDEMY COURSE CERTIFICATE



Appendix – 8

COURSERA COURSE CERTIFICATE



## Appendix – 9

## Documentation of micronutrients-based snacks recipes

S. No	Name of the recipe	Ingredients used	Steps for preparation
1.	Quinoa Yam Cutlet	<ol style="list-style-type: none"> <li>1. Quinoa-3tbsp</li> <li>2. Gingelly Oil-50 g</li> <li>3. Finely chopped onion-30g</li> <li>4. Garam Masala-1/2 tsp</li> <li>5. Turmeric Powder-1/2 tsp</li> <li>6. Red chilli powder-1 tsp</li> <li>7. Cumin powder-1 tsp</li> <li>8. Coriander powder-1 tsp</li> <li>9. Carrot -30g</li> <li>10. Beans-20g</li> <li>11. Yam boiled and mashed-1 tbs</li> <li>12. Salt to taste</li> </ol>	<ol style="list-style-type: none"> <li>1. Rinse quinoa well in Water. Bring 2 cup of Water to a boil. Add one teaspoon of salt into quinoa.</li> <li>2. Reduce the heat to low, cover the pan and let it cook for 15-20 mins.</li> <li>3. Heat oil in a pan. Add chopped onion, garam masala, turmeric powder, red chilli powder, cumin and coriander powder, and shredded vegetables and salt.</li> <li>4. Add boiled yam and cooked quinoa and mix well until the mixture is dry.</li> <li>5. Once the mixture cools, roll a golf-sized ball and flatten it into a patty. Dip this the besan flour or egg coating and coat it with coconut flour.</li> <li>6. Pour oil into a pan. Shallow fry on medium to medium-high heat till the coating is golden brown colour.</li> <li>7. Coating- Mix besan flour &amp; Water to form a slightly thick batter.</li> </ol>
2.	Rajkira Crackers	<ol style="list-style-type: none"> <li>1. Amaranth seed flour-1 cup</li> <li>2. Jaggery-1/2 cup</li> <li>3. Butter-1/2 cup</li> <li>4. Cardamom powder-1/4tsp</li> <li>5. Egg-1</li> <li>6. Salt as pinch</li> </ol>	<ol style="list-style-type: none"> <li>1. Sieve amaranth flour and salt together.</li> <li>2. Cream butter and Jaggery</li> <li>3. Beat egg into the creamed butter and Jaggery.</li> <li>4. Add sieved flour mixture and mix till it becomes soft and smooth into a dough consistency.</li> <li>5. Grease the baking sheet lightly with butter &amp; make it two round shapes, and place in a baking sheet one inch apart.</li> <li>6. Bake in a preheated oven at 180*c for 15 to 20 minutes.</li> <li>7. Cool and store in an airtight container.</li> </ol>
3.	Square Nut Bag	<ol style="list-style-type: none"> <li>1. Groundnut-2 tbsp</li> <li>2. Walnut-2tbsp</li> <li>3. Pistachio nuts-2tbsp</li> <li>4. Brown Dates-2 nos</li> <li>5. Jaggery-4 tbsp</li> <li>6. Sunflower seeds-2teaspoon</li> <li>7. Butter- grease</li> </ol>	<ol style="list-style-type: none"> <li>1. Chop the groundnut, walnut, pistachio nuts cut into even pieces and roast the nuts and sunflower seed.</li> <li>2. Grind the dates until they reach a paste consistency.</li> <li>3. Take a pan, add on Jaggery, stir first and add on roasted sunflower seeds and nuts, dates mix well all bind together leave it for 5 minutes</li> <li>4. Remove the pan and keep aside it cool for 10 minutes.</li> <li>5. Grease the bowl with butter and transfer the prepared mixture.</li> <li>6. Place in refrigerator for 1 hr.</li> </ol>

			7. Finally, cut it into square shape pieces and serve it.
4.	Scopy Urdu Muffin	<ol style="list-style-type: none"> <li>1. Brown dates-3 nos</li> <li>2. Butter-1/2 cup</li> <li>3. Jaggery-1/2cup</li> <li>4. Egg-1</li> <li>5. Black gram flour-1 cup</li> <li>6. Cinnamon powder -pinch</li> <li>7. Chopped walnuts-2 tbsps</li> <li>8. Cardamom powder- pinch.</li> </ol>	<ol style="list-style-type: none"> <li>1. Sieve the whole black gram flour and salt.</li> <li>2. Cream butter with Jaggery till light.</li> <li>3. Beat egg with cinnamon &amp; cardamom powder into the creamed butter and Jaggery.</li> <li>4. Add sieved flour mixture and chopped dates and walnuts. Mix and pour into greased cup mould two-thirds full.</li> <li>5. Bake 180* c for 15-20 minutes.</li> <li>6. Cool for 5 minutes before removing from muffin pan may be frozen for up to three months.</li> </ol>
5.	Amaransu Smoothie	<ol style="list-style-type: none"> <li>1. Cooked Amaranth leaves-1 cup</li> <li>2. Banana sliced- 1/2 nos</li> <li>3. Milk- ¼ cup</li> <li>4. Brown Dates-4</li> <li>5. Flaxseed-1/4 tsp</li> <li>6. Sunflower seed-1/4tsp</li> <li>7. Almond-5</li> </ol>	<ol style="list-style-type: none"> <li>1. Take amaranth leaves and wash thoroughly with Water.</li> <li>2. Transfer into a cooker and cooked well for 10 minutes.</li> <li>3. Let it cool for some time and transfer into a blender and combine banana, milk, dates, seed, almond blend until completely smooth consistency.</li> <li>4. Serve into glasses</li> <li>5. Garnish with sliced almond if desired.</li> </ol>
6.	Nut Coated Little Millet Cookies	<ol style="list-style-type: none"> <li>1. Horse gram flour-3/4 cup</li> <li>2. Chopped groundnuts-3tbsps</li> <li>3. Black gram whole flour-1/4 cup</li> <li>4. Butter-1/2 cup</li> <li>5. Jaggery-1/2 cup</li> <li>6. Butter for greasing</li> </ol>	<ol style="list-style-type: none"> <li>1. Sieve horse gram flour, whole black gram flour, and salt together.</li> <li>2. Cream butter and Jaggery</li> <li>3. Beat egg into the creamed butter and Jaggery.</li> <li>4. Add sieved flour mixture and mix well</li> <li>5. Add chopped groundnuts and mix till they become soft and smooth into a dough consistency.</li> <li>6. Divide the dough into ten equal portions and roll each portion into a small round.</li> <li>7. Grease the baking tray lightly with butter &amp; bake in a preheated oven at 180*c (360*F) for 15 to 20 minutes.</li> <li>8. Cool and store in an airtight container</li> </ol>
7.	Curry Stalk Pakodas	<ol style="list-style-type: none"> <li>1. Curry leaves-1/2 cup</li> <li>2. Onion stalk-1/2 cup</li> <li>3. Pepper-1/4 tsp</li> <li>4. Besan flour- 1/4 cup</li> <li>5. Red chilli powder-1/4 tsp</li> <li>6. coriander powder-1/4 tsp</li> <li>7. Cumin Powder-1/4 tsp</li> <li>8. Salt to taste</li> <li>9. Water as needed</li> <li>10. Gingelly Oil-50 g</li> </ol>	<ol style="list-style-type: none"> <li>1. Wash &amp; dry the curry leaves and onion stalk.</li> <li>2. Use a mixer, coarsely grind or pound the curry leaves &amp; onion stalk.</li> <li>3. Mix in a bowl: Besan flour, coriander powder, cumin powder, red chilli powder, salt pinch.</li> <li>4. Add enough water to make a thick batter and mix thoroughly.</li> <li>5. Heat oil to smoking point.</li> <li>6. Make a curry leaves &amp; onion stalk, pepper and salt small ball.</li> </ol>

			<ol style="list-style-type: none"> <li>7. Dip the ball into a batter and drop it over the heating oil.</li> <li>8. Cook until it reaches the golden brown colour and serves it.</li> </ol>
8.	Energy Seed Coat	<ol style="list-style-type: none"> <li>1. <u>sunflower seeds</u> – 2tbsp</li> <li>2. <u>sesame seeds</u>-2tbsp</li> <li>3. <u>chia seeds</u>-2tbsp</li> <li>4. <u>flax seeds</u> -2tbsp</li> <li>5. Brown dates-2 nos</li> <li>6. <u>salt</u>- generous pinch</li> <li>7. Jaggery -3tbsp</li> </ol>	<ol style="list-style-type: none"> <li>1. Roast all the seeds on low flame for 2 minutes until it turns light brown.</li> <li>2. Grind the dates until they reach a paste consistency.</li> <li>3. Take a pan, add on Jaggery, stir first and add on roasted seeds&amp; dates; mix well all bind together leave it for 5 minutes</li> <li>4. Remove the pan and keep aside it cool for 10 minutes.</li> <li>5. Grease the bowl with butter and transfer the prepared mixture.</li> <li>6. Place in refrigerator for 1 hr.</li> <li>7. Finally, cut it into square shape pieces and serve it.</li> </ol>
9.	Trevally Nuggets	<ol style="list-style-type: none"> <li>1. Fish parai -100g</li> <li>2. pepper -1 tbsp</li> <li>3. Salt to taste</li> <li>4. ginger-garlic paste-1 tbsp</li> <li>5. red chilli powder-2 tbsp</li> <li>6. coriander powder-1tbsp</li> <li>7. cumin powder-1tbsp</li> <li>8. lemon juice- ½ tbsp</li> <li>9. eggs -1</li> <li>10. Coconut flour -2tbsp</li> <li>11. Oil -50g</li> </ol>	<ol style="list-style-type: none"> <li>1. Take the fish pieces in a large bowl, add crushed pepper, red chilli powder, coriander and cumin powder salt, ginger-garlic paste, squeeze the lemon juice into it, and mix well. Set aside for 15-20 minutes.</li> <li>2. Meanwhile, break-in 1eggs in another bowl. Add salt, crushed pepper, and mix well using a fork.</li> <li>3. Spread coconut flour on a plate and set it aside.</li> <li>4. dip in the egg mixture and coat each fish piece with flour,</li> <li>5. Heat sufficient oil in a Pan. Shallow fry the fish pieces till golden brown and crisp. Drain on absorbent paper.</li> </ol>
10	CheckboxNuggets	<ol style="list-style-type: none"> <li>1. Beetroot-40g</li> <li>2. Green peas-20g</li> <li>3. Onion-20g</li> <li>4. cumin powder -1/2 tsp</li> <li>5. coriander powder- 1/2 tsp</li> <li>6. garam masala powder -1/2 tsp</li> <li>7. red chilli powder-1 tsp</li> <li>8. Salt to taste</li> <li>9. Pepper powder-1/2 tsp</li> <li>10. Desiccated Coconut flour-2 tb</li> <li>11. Gingelly Oil -50g</li> <li>12. Besan flour- 3tbsp</li> <li>13. Water- if required</li> </ol>	<ol style="list-style-type: none"> <li>1. Add beetroot, green peas, cumin powder, coriander powder, garam masala powder, red chilli powder, salt and black pepper in a pan and mix well.</li> <li>2. Divide the prepared mixture into equal portions and shape it into nuggets.</li> <li>3. Mix besan flour and Water as required into a thin slurry.</li> <li>4. Heat sufficient oil in a Pan.</li> <li>5. Dip the nuggets in slurry and coat them with coconut flour.</li> <li>6. Shallow-fry nuggets in hot oil till golden brown. Drain on absorbent paper.</li> </ol>

Recipes	Ingredients (g/ml)	Standard (S)	V 1	V 2	V 3
<b>QUINOEAM YAM CUTLET</b>	Quinoa	-	40	60	80
	Potato	100	-	-	-
	Carrot	30	35	35	35
	Beans	20	15	15	15
	Onion	30	35	35	35
	Oil	20	15	15	15
<b>Rajkira Crackers</b>	Maida	60	-	-	-
	Amaranth seed flour	-	40	60	80
	Jaggery	30	30	30	30
	Butter	30	30	30	30
	Cardamom powder	1	1	1	1
	Egg	1	1	1	1
<b>SQUARE NUT BAG</b>	Groundnut	50	50	75	100
	Walnut	20	25	35	45
	Pistachio nuts	10	15	20	25
	Honey	7	-	-	-
	Brown Dates	5	5	5	5
	Jaggery	-	20	20	20
	Sunflower seeds	-	7	7	7
<b>SCOPY URDU MUFFINS</b>	Brown dates	-	5	5	5
	Butter	30	30	30	30
	Sugar	30	-	-	-
	Jaggery	-	30	30	30
	Egg	1	1	1	1
	Maida	50	-	-	-
	Black gram flour	-	40	60	80
	Chopped walnuts	5	10	10	10
<b>AMARANSU SMOOTHIE</b>	Cooked Amaranth leaves	-	20	30	40
	Sugar	10	-	-	-
	Banana sliced	50	20	20	20
	Milk	80ml	60	60	60
	Brown Dates	5	10	10	10
	Flaxseed	-	6	6	6
	Sunflower seed	-	6	6	6
	Almond	5	3	3	3
<b>NUT COATED LITTLE MILLET COOKIE</b>	Horse gram flour	-	30	40	60
	Maida	50	-	-	-
	Egg	1	-	-	-
	Sugar	25	-	-	-
	Milk	-	-	-	-
	Chopped groundnuts	-	10	10	10
	Black gram whole flour	-	30	30	30
	Butter	25	20	20	20
Jaggery	-	20	20	20	

<b>CURRY STALK PAKODI</b>	Curry leaves	-	20	25	30
	Onion stalk	-	20	30	40
	Onion	30	-	-	-
	salt	5			
	Pepper	-	6	6	6
	Besan flour	15	15	15	15
	Red chilli powder	5	4	4	4
	coriander powder	5	3	3	3
	Cumin Powder	-	4	4	4
	Gingelly Oil	25	25	25	25
<b>8. ENERGY SEED COAT</b>	sunflower seeds	-	20	40	60
	Oats	30	-	-	-
	Almond	10	-	-	-
	Honey	10	-	-	-
	sesame seeds	-	10	15	20
	chia seeds	5	5	10	15
	flax seeds	5	10	20	30
	Brown dates	5	5	5	5
	Jaggery	-	15	15	15
	<b>9. TREVALLY NUGGETS</b>	Fishparai	-	40	60
Chicken		60	-	-	-
Pepper		5	10	10	10
ginger-garlic		10	10	10	10
red chilli powder		5	5	5	5
coriander powder		5	5	5	5
cumin powder		4	4	4	4
lemon juice		1	1	1	1
eggs		1	1	1	1
Coconut flour		-	20	20	20
Breadcrumbs flour		10	-	-	-
Oil		50	50	50	50
<b>10. CHECKBOX NUGGETS</b>	Beetroot	-	10	20	30
	Green peas	-	10	15	20
	Potato	50	-	-	-
	Onion	20	10	10	10
	Cumin powder	5	6	6	6
	Coriander powder	5	4	4	4
	Garam masala powder	7	4	4	4
	Red chilli powder	5	6	6	6
	Pepper powder	5	4	4	4
	Desiccated Coconut flour	-	10	10	10
	Breadcrumb	10	-	-	-
	Gingelly Oil	50	50	50	50
	Besan flour	15	15	15	15

## Appendix – 10

## Plagiarism Report

**Avinashilingam Institute for Home Science and Higher Education for Women**

(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category A by MHRD)

Re-accredited with 'A++' Grade by NAAC.CGPA 3.65/4, Category I by UGC

Coimbatore – 641 043, Tamil Nadu, India

**PLAGIARISM CHECK REPORT (THESES)**

1.	Name of the Research Scholar	Soundariya S
2.	Roll No. and Year of Registration	19PHFNF003, 2019
3.	Department	Food Science and Nutrition
4.	Name of the Research Guide	Dr. C.A. Kalpana
5.	Title of the Thesis / Dissertation	Digital Technology Assisted Nutrition Support for Children with Attention Deficit Hyperactivity Disorder
6.	Similarity Content (%) Identified	7%
7.	Software Used	Turnitin
8.	Date of Verification	07-02-2023

**Note :** The report is excluding 14 Consecutive words, Review of Literature and Quoted Materials.

Checked by :

*J. J. 07/2/23*  
 J. J. Information Scientist

*S. Soundariya 07/02/23*  
 Research Scholar

*J. J. 07/2/23*  
 Assistant Librarian

*A. Kalpana 07/2/23*  
 Research Guide

Date: 07-02-2023

## Digital Technology Assisted Nutrition Support for Children with Attention Deficit Hyperactivity Disorder

### ORIGINALITY REPORT

<b>7%</b> SIMILARITY INDEX	<b>6%</b> INTERNET SOURCES	<b>5%</b> PUBLICATIONS	<b>2%</b> STUDENT PAPERS
-------------------------------	-------------------------------	---------------------------	-----------------------------

### PRIMARY SOURCES

<b>1</b>	<a href="http://www.researchgate.net">www.researchgate.net</a> Internet Source	<1 %
<b>2</b>	<a href="http://www.iosrjournals.org">www.iosrjournals.org</a> Internet Source	<1 %
<b>3</b>	<a href="http://www.tarj.in">www.tarj.in</a> Internet Source	<1 %
<b>4</b>	<a href="http://worldwidescience.org">worldwidescience.org</a> Internet Source	<1 %
<b>5</b>	<a href="http://www.science.gov">www.science.gov</a> Internet Source	<1 %
<b>6</b>	<a href="http://vdocument.in">vdocument.in</a> Internet Source	<1 %
<b>7</b>	Managerial Finance, Volume 32, Issue 2 (2006-09-19) Publication	<1 %
<b>8</b>	Narayanasamy Sangeetha, S. Premakumari. "Effect of Micronutrient Supplementation on the Nutritional and Immune Status of School	<1 %

## Appendix – 11

### Publications



#### Avinashilingam Institute for Home Science and Higher Education for Women

(Deemed to be University Estd. u/s 3 of UGC Act 1956, Category 'A' by MHRD  
Re-accredited with A++ Grade by NAAC. CGPA 3.65/4, Category I by UGC  
Coimbatore - 641 043, Tamil Nadu, India

#### Appendix L2

(Item No 5 of Check List)

#### Details of Research Publications

S.No	Article	Journal	Other Details Vol/No/Page No/ Year	Published in UGC-CARE / Scopus Indexed/ Web of Science
1	Formulation and Evaluation of Quinoa (Chenopodium quinoa) cutlet	Journal of Food, Agriculture & Environment	Vol.19(1): 28-31,2022	UGC CARE GROUP -I
2	Optimisation and Characterisation of Gluten-Free Gram Cookies for Attention Deficit Hyperactivity Disorder children	Journal of Xi'an Shiyou University, Natural Science Edition	Vol.18(3):51-68,2022	UGC CARE GROUP - II Scopus

\*Proof of list of Journals from Internet to be attached along with copies of reprints.

Scholar : *S. Sundariniya*  
17/8/22

Supervisor : *Abhishek*  
17/8/22

*M. Jyoti*  
17.8.22  
Checked By: *Nandi*

HoD/Dean of Respective School

1. Journal of Food, Agriculture & Environment is available in Group I of UGC care list,
  2. Journal of Xi'an Shiyou University, Natural science Edition is renamed as Xi'an Shiyou Daxue Xuebao is available on the Scopus website as of today 17.08.2022.
- J. Jyoti*  
17.08.2022



## Formulation and evaluation of quinoa (*Chenopodium quinoa*) cutlet

Shankar Soundariya \* and Chinnappan A. Kalpana

Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Bharathi Park Rd, Saibaba Colony, Coimbatore, Tamil Nadu 641043, India. \*e-mail: 19phfnf003@avinuty.ac.in, kalpana\_fsn@avinuty.ac.in

Received 18 October 2021, accepted 16 December 2021.

### Abstract

Quinoa is a most popular health food and is gluten-free, rich in dietary fibre, high in protein and minerals, and has beneficial antioxidants. These components may exert beneficial effects on metabolic, cardiovascular, and gastrointestinal health. The study was undertaken to formulate cutlets, a snack from quinoa, to evaluate their acceptability based on organoleptic parameters, and to analyse their nutrient content. The overall acceptability and mean scores for the recipe were analysed by sensory evaluation using a five-point scale and a panel of thirty semi-trained panel members. The best variation of quinoa cutlet was analysed for selected nutrients using standardised methods. The study findings revealed that quinoa cutlets had a higher content of minerals, protein, fibre, omega-3 fatty acids and present in sufficient quantities for a balanced diet.

**Key words:** Quinoa, *Chenopodium quinoa*, cutlet, nutrient analysis, sensory evaluation.

### Introduction

Quinoa (*Chenopodium quinoa*) is a gluten and casein-free additive with a high content of good quality protein, starch and a small percentage of sugars<sup>1</sup>. Quinoa has essential vitamins and minerals such as B complex, vitamin E, and C and calcium, magnesium, iron, phosphorus, zinc, and copper. It also has a high content of omega-3 fatty acids and abundant quantities of fibre<sup>2</sup>. Furthermore, these cereals are a good source of many bioactive compounds with health-promoting effects such as phytosterols, polyphenols, saponins, squalene, phytoecdysteroids, phenolics, betalains, and glycine betaine<sup>1</sup>.

Quinoa is an excellent example of a “functional food” and can reduce the risk of degenerative diseases such as cancer, obesity, and dyslipidemia. Its functional properties may be related to the presence of fibre, minerals, vitamins, fatty acids, antioxidants, and plant hormones that supply to human nutrition, particularly in the protection of cell membranes, resulting in a neuronal function. These characteristics provide the grain with a significant advantage over other plant food sources for human nutrition and health improvement<sup>3</sup>, and make quinoa an excellent dietary choice for people following a vegan diet. Quinoa can be easily incorporated into the diet and can be used instead of rice in any recipe. Quinoa has an exact batty taste that makes it a very versatile ingredient and may be used in baked foods or as a breakfast cereal.

Cutlet is a commonly consumed snack due to its taste, flavour, crispness, and eating convenience and favoured among all age groups, especially in children. Usually, a cutlet is prepared from maida flour, which is deficient in essential amino acids like lysine and tryptophan. In contrast, quinoa grains are rich in lysine and tryptophan<sup>4</sup>. Cutlets are prepared with fortified or composite flour to increase their nutritive value. With this in view, the current study was carried out to formulate quinoa cutlets, evaluate their acceptability based on the organoleptic parameters and analyse the nutrient content.

### Materials and Methods

**Preparation of cutlets:** Quinoa, gingelly oil, onion, garam masala, turmeric powder, red chilli powder, cumin powder, coriander powder, carrot, beans, yam, salt, gram flour, and coconut flour were purchased from a local market. The cutlets were prepared in the Foods Laboratory, Avinashilingam Institute for Home Science and Higher Education for Women. Quinoa was soaked for ten minutes and then pressure cooked for five minutes. Onions, carrots, and beans were finely chopped and cooked. Added oil in a pan, sauteed the chopped vegetables, added masala powder, boiled yam, cooked quinoa and mixed well. A slightly thick batter of gram flour was prepared for dipping. Once the mixture cooled, rolled a golf-sized ball and flattened them into a patty. The patty was dipped in batter and coated with coconut flour. Finally, the quinoa cutlet was shallow fried in a pan with gingelly oil till it turned golden brown.

**Formulation and standardisation of quinoa cutlet:** Four variations of the quinoa cutlet was formulated. Table 1 presents the composition of the ingredients and Fig. 1 the standard and formulated cutlets. A variation of 40%, 60%, 80%, and 100% of quinoa were formulated, 100 g of potato and 30 g of carrot and beans were used to prepare the standard cutlet.

**Table 1.** Composition of the ingredients.

Ingredients (g/ml)	Standard (S)	V 1	V 2	V 3	V 4
Quinoa	-	40	60	80	100
Potato	100	-	-	-	-
Carrot	30	50	40	35	30
Beans	20	45	40	35	25
Onion	30	50	45	35	30
Oil	20	15	15	15	15



**Figure 1.** Formulated quinoa cutlets.

**Sensory evaluation:** Sensory evaluation is a systematic tool that uses the human senses, smell, sight, taste, touch, and hearing, to investigate the characteristics that impact the excellent quality of the outcome <sup>5</sup>.

The formulated cutlets were subjected to sensory evaluation in the Foods Laboratory. A thirty-member semi-trained sensory panel were selected from the Department of Food Science and Nutrition. Ratings were on a 5-point hedonic scale with a score ranging from 5 to 1, graded as Like very much, Like slightly, Neither like nor dislike, Dislike slightly, and Dislike very much, respectively. Cutlets were evaluated based on appearance, colour, flavour, taste, texture, and overall acceptability. Sensory evaluation was conducted at mid-morning (10.30 am -11.30 am). The portion sizes for all three samples were kept consistent and uniform. Scores were computed, the average of sensory parameters and the mean scores for all these attributes were calculated.

**Colour measurement:** Colour was measured using the CIE L, a, and b colour system as stated by (CIE)<sup>6</sup>. A total of three spectral readings were taken for samples on different locations. Lightness (L\*) (dark to light) and the redness (a\*) values (reddish to greenish). The yellowness (b\*) value (yellowish to bluish) were also estimated.

**Nutrient analysis:** The formulated quinoa cutlets were analysed for selected nutrients. Proximate composition of quinoa cutlets was analysed and expressed according to methods such as moisture method No 44-15 of AOAC <sup>7</sup>, ash method No 08-01 of AOAC <sup>7</sup>. Carbohydrate content was determined by anthrone method, protein was analysed by Kjeldahl method No 46-10 of AOAC <sup>7</sup>, fat by Soxhlet extraction method No 30-25 of AOAC <sup>7</sup>, crude fibre method No 32-10 of AOAC <sup>7</sup>, dietary fibre content was analysed by AOAC enzymatic gravimetric method and energy content was analysed by the percentages of protein, fat, and carbohydrate using the Atwater conversion factors of 4,9,4, respectively <sup>8</sup>.

Vitamin B6 and C were assessed by titrimetric method No 34-38 of AOAC <sup>7</sup>, calcium and magnesium by titrimetric method, iron and phosphorus content by colorimetric method, and zinc was

analysed by atomic absorption spectrophotometer 40-71 of AOAC<sup>7</sup>.

**Statistical analysis:** Data of sensory evaluation and nutrient analysis of quinoa cutlets were statistically analysed. Mean and standard errors were calculated for different parameters. The consolidated data were subjected to analysis of variance techniques using the Statistical Package for the Social Sciences (SPSS) version 20 program at (p≤0.05).

## Results and Discussion

**Sensory evaluation of formulated quinoa cutlets:** The overall acceptability and mean scores of the cutlets are presented in Table 2 and Fig. 2. After the formulation of quinoa cutlets with four different variations, the appearance, colour, flavour, taste, and texture of the quinoa cutlet were evaluated. The mean scores of quinoa cutlets were 4.9±0.3, 4.8±0.3, 4.8±0.4, 4.7±0.5, and 4.8±0.4 for the different variations and the least acceptable cutlets were those of 40 and 60 g, respectively. The overall acceptability of quinoa cutlets at 100% level (V4) was found to be maximum (4.7±0.6). Results were on par with a study on quinoa flour <sup>9</sup>. Table 3 shows t-values of standard and quinoa cutlets, the standard cutlet and the four variations had significant differences (p≤0.01) in the attributes, including the overall acceptability of the product. Similar findings were observed by Li <sup>10</sup>.

**Colour characteristics:** The colour characteristics of the most acceptable quinoa cutlet are presented in Table 4. Lightness (L\*) in food is influenced by factors like water content, surface water availability and the concentration and type of pigments. Quinoa cutlet had a coordinate of 32.82. For the red-green coordinate, redness, (a\*), the quinoa cutlet showed a value of -11.74 while for the yellow-blue coordinate, yellowness, (b\*) a value of 16.53 was exhibited. Total colour difference, (E\*) findings were 26.51.

**Nutrient content of formulated snacks with quinoa cutlet:** The most acceptable (100 g) quinoa cutlet was analysed to find out the nutrient content such as moisture, ash, energy, carbohydrates, protein, fat, crude fibre, dietary fibre, vitamin B6, vitamin C, calcium,

**Table 2.** Overall acceptability and mean scores of the cutlets.

Sensory attributes	Standard Mean ±SD	V 1 Mean ±SD	V 2 Mean ±SD	V3 Mean ±SD	V4 Mean ±SD
Appearance	3.8±0.8	3.4±1.0	3.4±1.2	4.2±0.5	4.9±0.3
Colour	4.0±0.7	3.3±1.2	3.3±1.2	4.1±0.4	4.8±0.3
Flavour	3.7±0.8	3.4±0.8	3.4±1.1	4.2±0.4	4.8±0.4
Taste	3.9±0.8	3.3±1.0	3.3±0.9	4.1±0.4	4.7±0.5
Texture	3.8±0.8	3.3±1.2	3.4±0.9	4.2±0.5	4.8±0.4
Overall acceptability	4.0±0.6	3.1±1.1	3.4±1.0	4.3±0.5	4.7±0.6

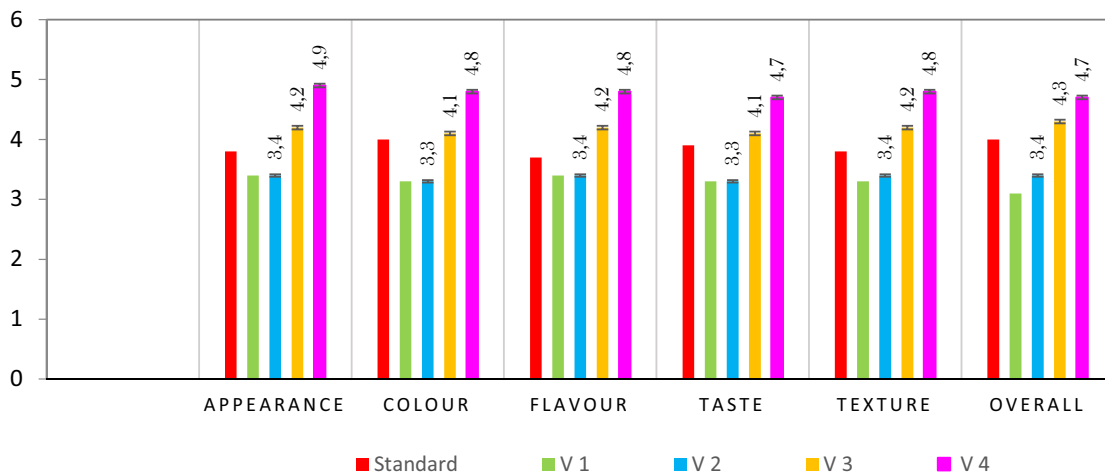


Figure 2. Overall acceptability and mean scores of the cutlets.

Table 3. ‘t’ values of standard and quinoa cutlets.

	Appearance	Colour	Flavour	Taste	Texture	Overall acceptability	P value
Standard	24.0	27.8	24.7	26.6	24.5	32.2	
V1	18.5	15.0	21.7	17.7	14.9	14.7	<0.001*
V2	14.5	15.1	16.4	19.1	20.1	18.2	
V3	46.0	52.1	51.9	52.1	46.0	44.0	
V4	87.9	77.0	61.3	49.7	54.2	41.7	

\*Significant at 1% level

Table 4. Colour characteristics of the quinoa cutlet.

Colour characteristics	Value
Lightness (L*)	32.82
Redness, (a*)	-11.74
Yellowness, (b*)	16.53
Total colour difference ( $\Delta E^*$ )	26.51

iron, phosphorus, magnesium, zinc and omega-3 fatty acids. The nutrients analysed are presented in Table 5. The amount of ash and moisture content of quinoa cutlet was 0.4% and 45.9% per 100 g. Energy, carbohydrate, protein, and fat contents were 304.8 kcal, 26.2 g, 9.5 g and 18.0 g, respectively. Crude fibre and dietary

Table 5. Nutrient contents of quinoa cutlet.

S.no	Nutrients	Mean±S.D
1.	Ash (%)	0.41±0.01
2.	Moisture (%)	45.9±0.01
3.	Energy (kcal)	304.7±0.07
4.	Carbohydrates (g)	26.17±0.01
5.	Protein (g)	9.52±0.01
6.	Fat (g)	17.9±0.01
7.	Omega-3 fatty acid (g)	6.51±0.01
8.	Crude fibre (g)	3.55±0.01
9.	Dietary fibre (g)	6.20±0.01
10.	Vitamin B6 (mg)	0.17±0.01
11.	Vitamin C (mg)	5.25±0.01
12.	Calcium (mg)	40.4±0.30
13.	Iron (mg)	3.03±0.01
14.	Phosphorus (mg)	213.3±1.52
15.	Magnesium (mg)	86.2±0.25
16.	Zinc (mg)	5.40±0.02

fibre were 3.6 g and 6.2 g, respectively. The contents of vitamins B6 and C were 0.2 mg and 5.2 mg, respectively. Calcium, iron, phosphorus, magnesium and zinc contents formulated with quinoa cutlets were 40.1 mg, 3.1 mg, 213 mg, 86.5 mg and 5.4 mg, respectively. Omega-3 fatty acid content was 6.5 g. The findings were similar to Bhathal *et al.*<sup>11</sup>.

## Conclusions

Quinoa cutlets had an overall acceptability in appearance, taste, colour, flavour and texture and may be used as a snack for all age groups. Quinoa cutlets had a good nutrient content and appreciable amounts of dietary fibre. Consumption of nutrient-rich quinoa may help to improve human health and lower the risk of chronic degenerative diseases. Mineral content with particular reference to zinc and magnesium and a good omega-3 fatty acid content in the quinoa cutlet may support children with neurological disabilities such as autism and attention deficit hyperactivity disorders.

## Acknowledgements

The authors wish to acknowledge the Department of Adidravida and Tribal Welfare, Government of Tamilnadu, India, for providing scholarship for this study.

## References

- <sup>1</sup>Vilcacundo, R. and Hernández-Ledesma, B. 2017. Nutritional and biological value of quinoa (*Chenopodium quinoa* Willd.). *Current Opinion in Food Science* **14**:1–6.
- <sup>2</sup>Nowak, V., Du, J. and Charrondiere, U. R. 2016. Assessment of the nutritional composition of quinoa (*Chenopodium quinoa* Willd.). *Food Chemistry* **193**:47-54.
- <sup>3</sup>Serna-Saldivar, S., Gutierrez-Urbe, J. and Garcia-Lara, S. 2015. Phytochemical profiles and nutraceutical properties of corn and wheat tortillas. In Rooney, L. W. and Serna-Saldivar, S. O. (eds). *Tortillas*:

Wheat flour and corn products. AACC, International Press, St. Paul, MN, pp. 65–93.

- <sup>4</sup>Nascimento, A. C., Mota, C., Coelho, I., Gueifão, S., Santos, M., Matos, A.S., Gimenez, A., Lobo, M., Samman, N. and Castanheira, I. 2014. Characterisation of the nutrient profile of quinoa (*Chenopodium quinoa*) consumed in the North of Argentina: proximates, minerals and trace elements. *Food Chemistry* **148**:420–426.
- <sup>5</sup>Chambers, E. IV 2019. Editorial: Analysis of Sensory Properties in Foods: A Special Issue. *Foods* **8**(8):291; <https://doi.org/10.3390/foods8080291>.
- <sup>6</sup>CIE 1976. International Conference on Digital Printing Technologies. pp. 425-873, pp. 540-545(6).
- <sup>7</sup>AOAC 2010. Official Methods of Analysis. Association of Official Analytical Chemists, Arlington, USA.
- <sup>8</sup>Merrill, A.L. and Watt, B.K. 1973. Energy Value of Foods: Basis and Derivation. Agriculture Handbook No. 74, ARS United States Department of Agriculture, Washington DC.
- <sup>9</sup>Kahlon, T. S., Avena-Bustillos, R. J. and Chiu, M. M. 2016. Sensory evaluation of gluten-free quinoa whole grain snacks. *J. Heliyon* **2**(12): Article No. e00213.
- <sup>10</sup>Li, L. 2018. Effects of quinoa (*Chenopodium quinoa* Willd.) consumption on markers of CVD risk. *Nutrients* **10**(6):777.
- <sup>11</sup>Bhathal, S. K., Kaur, N. and Grover, K. 2015. Organoleptic and nutritional evaluation of gluten-free products from quinoa (*Chenopodium quinoa*) grain. *International Journal of Food and Nutritional Sciences* **4**(4):141-147.

# Optimisation and Characterisation of Gluten-Free Gram Cookies for Attention Deficit Hyperactivity Disorder children

S.Soundariya<sup>1</sup> and C.A. Kalpana<sup>2</sup>

Department of Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, India-43

## Abstract

Attention-deficit hyperactivity disorder (ADHD) is a disorder that involves a child's academic, social, and family functioning. The prevalence of the disorder is approximately 5.3% worldwide and occurs mainly in boys. Research has indicated that diet or nutritional intervention may decrease the rate of conduct and personality disorders. The present study was carried out with the aim of formulating and evaluating gluten-free Gram based cookies. The formulated cookies were analysed and compared based on nutritional, sensory, physical, and textural indices. On the basis of sensory evaluation, the overall acceptability of gluten-free Gram cookies was found to be  $4.80 \pm 0.41$ , and that of control cookies was  $4.13 \pm 0.76$ . The parameters considered for sensory evaluation were appearance, colour, flavour, taste and texture. Gram Cookies recorded the highest values in protein, moisture, ash, dietary fibre, energy and omega-3 fatty acids: 14.60g, 0.65%, 1.43%, 11.58g, 538.52Kcal, and 6.64g. A significant difference ( $p < 0.05$ ) in calcium, iron, Phosphorus, Magnesium and Zinc and Vitamin B<sub>6</sub> and Vitamin C composition of Gram Cookies and control cookies was observed. Hence, it can be suggested that value-added cookies is beneficial for ADHD children for enhancing their cognitive functions and nutritional status.

**Index Terms:** Cookies, Gram, Analysis, Gluten-free, ADHD

## I. Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is among the most prominent behavioural disorders of children worldwide, occurring in 5.3% of children. ADHD manifests itself through excessive impulsivity, inattention, hyperactivity, and long-term emotional, mental, and academic difficulties. A high prevalence and incidence of

psychological disorders may be related to nutritional status, brain growth, and cognitive functioning. Children with ADHD must follow a healthy diet regimen. Evidence suggested that nutritional value, eating patterns, and other behaviour features can impact neuropsychiatric disorders, along with ADHD. Dietary combinations containing micronutrients such as vitamins, minerals and polyunsaturated fats are suggested as being supportive in treating ADHD (Lange, 2020) [1]

Among the bakery products, cookies are essential food products used as snacks by children (Pal et al., 2018) [2]. The low moisture content of cookies makes them immune from microbial spoilage and ensures to retain their quality for more extended periods, such as bread and cakes (Kurniadi *et al.*, 2018) [3]. It is possible to manufacture and distribute large quantities of cookies due to the long shelf life. Fortification and other improvements to their nutritional quality make them an attractive food choice, provide some nutrients to people at risk for nutritional insufficiency, enhance the nutritional content value of food, and provide certain technological functionality in food processing. (Rani *et al.*, 2020)[4]. In the present study, wheat was replaced by horse and black grams flour to prepare gluten-free Gram cookies.

Wheat contains gluten, such as in rye, wheat, and barley, which causes Gluten sensitivity (NIDDK, 2008). It is markedly more frequent among children presenting with ADHD. Interestingly, Celiac disease may show symptoms similar to those of ADHD in a significant percentage of children before collecting the start of a gluten-free diet. Therefore, despite the different views on this topic, some scientists advised screening for this disease in studying children with suspected ADHD. Celiac disease manifestations of other neurological and psychiatric include peripheral neuropathy, ataxia, seizures, migraine, depression, autism spectrum disorders, anxiety disorders and schizophrenia. It is a gluten-free diet for ADHD, as it reduces the child's abnormal behaviour. (Niederhofer *et al.*, 2011) [5]. A child usually recovers faster than an adult does. In addition to reducing the risk of long-term complications caused by untreated ADHD symptoms, having a gluten-free diet decreases the chances of suffering from these complications. The study is a sequence of those steps and purposeful to prepare Gram-based cookies. According to the current study, horse gram and black gram flour is used to replace wheat flour. Horse and black grams are highly nutritious and rich in fibre, protein, unsaturated fats, squalene, zinc, phenolic compounds, flavonoids, vitamins, and minerals. It provides many health benefits outside of its nutritional value, which allows it to be classified as a “functional food.”

Gram cookies substituting wheat cookies are not available commercially. Products (cookies, biscuits, bread) baked with Horse gram and black gram flour for fibre or other purposes, but within specific ranges combined with

various kinds of flour. Therefore, this study was conducted with the following objectives: To formulate gluten-free cookies for ADHD children and assess the horse and black grams as the major ingredients of the cookies by substituting wheat flour with gram flour. The purpose is to standardise the recipe for Gram cookies and evaluate the nutritional, sensory, and textural qualities of cookies.

## II. Materials and methods

### A. Raw material selection

Fresh Horse gram and black Gram were procured from the local grocery stores, cleaned, rinsed, and sundried and were milled into flour. Other ingredients namely butter, jaggery, salt and egg were purchased from local stores.

### B. Baking Of Cookies

#### *Control cookies*

Biscuits are commonly made from wheat, the most common cereal used in their production. Gluten is considered crucial in making cookies, (Omeire *et al.*,2010) [6]. Generally, low gluten levels and weak gluten strength are desirable for a superior sugar-snap cookie. The preparation of control cookies involved sieving the wheat flour with baking powder, then blending the fat with powdered sugar, adding milk to prepare the dough soft and kneading the dough if necessary. The dough was made into balls and rolled it out. After cutting the cookies, greased the tray with butter and placed them in it. Preheated the oven for 10 minutes. The rolls were baked between 12 and 15 minutes at 200°C. Once baked, removed them and cooled on a cooling rack. As with the control cookies, the same measuring equipment, blender, and electric mixers were used to prepare the Gram cookies. The composition of the cookies prepared using the standard method (control cookies ) is listed in **Table 1**.

#### *Gram cookies*

Gram cookies were made from sieved horse gram and black gram flour, rich in Zinc and Omega-3fatty acids.

The preparation of Gram cookies involved weighing the ingredients using a weighing balance. Butter, jaggery, egg, horse gram and black gram flour were mixed. After resting for 20 minutes, the dough was baked. The cookies were shaped into small portions of equal weight, arranged on a baking tray and baked at 180°C for 15 minutes after baking. The cookies were cooled to room temperature before being used. The proportion between control cookies and Gram-formulated cookies is given in **Table 1**.

**Table 1** Proportion of Control cookies and formulated Gram cookies

CONTROL COOKIES		FORMULATED GRAM COOKIES	
Raw materials	Quantity	Raw materials	Quantity
Wheat flour	225 g	Horse gram &black gram flour	200 g
Baking powder	2.50 g	Egg	50 g
Sugar	130 g	Jaggery	75 g
Milk	60 ml	Butter	100g
Salt	2.16 g	Salt	as pinch

### C. Sensory Evaluation of Cookies

A semi-trained panel of 30 members rated the cookies based on their sensory characteristics. A list of terms identifying sensory characteristics was provided to the panel members. Scoring procedures evaluated typical quality attributes selected by Chopra N *et al.* (2018) [7]. A score list with a 5-point hedonic scale was applied.

### D. Determination of physical characteristics of the cookies

#### *Weight*

The weight of each cookie was determined using the method of (Ikuomola 2017) [8]. After the cookies had cooled, weighing balances were used to determine the weights.

#### *Diameter*

The diameter was determined by placing cookies side by side. Cookies were measured by measuring their diameters along the ruler. An angle of 90° was used for duplicate measurements. The diameter was repeated, and the average value is given in millimetres (AACC, 2000) [9]

### *Thickness*

The thickness was determined by stacking cookies on top of one another. The height of the total object was measured in millimetres using a ruler. Measurements were repeated three times to obtain an average value. The results are given in millimetres. (AACC, 2000). [9]

### *Spread ratio*

A spread ratio was determined by setting up pairs of equal-sized cookies and measuring their height. The diameters of each of them were measured after they were placed edge-to-edge. With the following formula, the spread ratio was calculated as diameter/height,  $SF = \frac{D}{T} \times 10$ . Cf is a correction factor at constant atmospheric pressure, whereas D and T are diameter and thickness. It has a value of 1.0 in this case. (AACC, 2000)[9]

### *E. Texture analysis of cookies*

A textural analysis was conducted on the cookies using a Texture Analyser (TA-XT2). Cookie hardness is measured by the maximum force that a cookie can withstand (gm, kg, N) before it breaks. In order to measure the hardness of cookies, a probe was used with an HDP/BSK blade set. In the application guide of the texture analyser, it was mentioned that the texture analyser was switched to ON', and then settings for hardness measurement of cookies were adjusted. A calibration was performed on the probe, and then the sample was placed on the texture analyser platform by (Li, 2020) [10].

### *F. Colour attributes of cookies*

A Hunter Lab Colorimeter (D-25, Hunter Associated Laboratory, USA) was used to determine the colour of baked cookies. As described, Hunter lab colourimetry was evaluated using Hunter colour standards before reading cookies samples (kuchtova, 2017) [11].

### *G. Nutrient Analysis*

Each cookie sample was analysed by standard methods (Association of Official Analytical Chemists) to determine its moisture, ash, protein, fat, and carbohydrate content within 100 grams. The samples were dried at 105°C until they reached a constant weight, at which point the moisture content was estimated with the gravimetric method. Using the bomb calorimeter method, energy was measured, and carbohydrate was measured by the anthrone method. To calculate crude protein from total nitrogen, the Kjeldahl method was applied. Calculating the nitrogen to crude protein ratio involves a conversion factor of 6.25%. To measure ash content, weighing the samples was done in a 550°C Muffle furnace until a constant weight was obtained. Socs

Plus was used to extract crude fat, and Fibra Plus was used for acid and alkali washing of crude fibre. Total dietary fibre as measured by Method 985.29 plus low molecular weight resistant maltodextrin (AOAC). Vitamin B<sub>6</sub> and C were assessed using a titrimetric method (AOAC) [12], and an atomic absorption spectrometer determined minerals (calcium, magnesium, phosphorus, iron, and zinc).

#### H. Statistical analysis

The statistical analysis was performed by Systat 14.5 software. Data are presented as Mean + Standard Deviation. Using One way ANOVA and 'F' values were calculated to determine whether the means of the two groups differed significantly. The Kruskal-Wallis test was used to analyse data with non-parametric distributions. Also, the frequency distributions of the two groups were compared by a T-test. The significance of p-values below 0.05 was regarded as statistically significant.

### III. Results

#### A. Physical Analysis of cookies

**Table 2:** Physical Analysis of cookies

Variable	Cookies	Mean±SD	t-value	p-value
Weight	Control Cookies	13.09±0.54	-17.323	.000*
	Gram Cookies	10.760.10		
Diameter	Control Cookies	17.27±0.02	-16.956	.000*
	Gram Cookies	17.15±0.01		
Thickness	Control Cookies	9.45±0.35	14.659	.000*
	Gram Cookies	6.85±0.21		
Spread Ratio	Control Cookies	5.12±0.33	13.215	.001*
	Gram Cookies	6.09±0.09		

\*= Significant at 1% level

As shown in the above table, the significance value for the independent t-test is 0.000, 0.000, 0.000, and 0.001. The difference between Control Cookies and Gram Cookies was statistically significant ( $p < 0.05$ ). Duncan's multiple range tests determined that various weights, diameters, and thicknesses were significant. Hence, the result showed that the two cookies differed in weight, diameter, consistency, and spread ratio (Ho et al., 2016). [13].

*B. Texture Analysis of cookies:*

**Table 3:** Texture analysis of cookies

Variable	Cookies	Mean±SD	t-value	p-value
Hardness	Control Cookies	1.40±0.71	5.645	.004*
	Gram Cookies	1.67±0.22		

\*= Significant at 1% level

A cookie's texture plays an essential role in comparing the cookies, as it can influence customer satisfaction of the product (Omran *et al.*, 2016) [14]. Gluten-free cookies should provide consumers with a pleasant taste. It is determined whether a cookie is of high quality through an objective and instrumental method. The hardness of the sample was measured with a texture analyser as the maximum peak force (gm/cm<sup>2</sup>) required to rupture it. Researchers found that control cookies were less complex or softer than Gram cookies. For control cookies, the hardness was 1.40±0.71, but for Gram Cookies, it was 1.67±0.22. Based on the independent t-test results, the hardness difference between Control Cookies and Gram Cookies is statistically significant ( $p < 0.05$ ). Thus, the result shows that two cookies varies in hardness. The development of a gluten network is the cause of cookie hardness, where gluten attracts water molecules to promote network development, as stated by (Kulthe et al., 2017) [15]. In the present study, the use of horse gram and black gram flour to prepare cookies could have contributed to the minor development of the gluten network.

*C. Colour Attributes of cookies:*

**Table 4:** Colour attributes of cookies

Variable	Cookies	Mean±SD	F-value	p-value
L*	Control Cookies	43.73±7.67	21.586	.000*

	Gram Cookies	28.50±4.14		
<b>a*</b>	Control Cookies	4.52±0.30	16.258	.001*
	Gram Cookies	7.43±1.09		
<b>b*</b>	Control Cookies	20.65±1.89	7.562	.006**
	Gram Cookies	41.21±0.11		

\*= Significant at 1% level, \*\*= Significant at 5% level,

Table 4 shows the colour characteristics of cookies (Control cookies and Gram Cookies). The colour of each cookie was determined by measuring its lightness ( $L^*$ ), redness ( $a^*$ ), and yellowness ( $b^*$ ). The table above shows the output of the One-way ANOVA. There is a statistically significant difference ( $p < 0.05$ ) in lightness ( $L^*$ ) and redness ( $a^*$ ) between Control Cookies and Gram Cookies, and there is a difference in yellowness ( $b^*$ ) at the 5% level ( $p < 0.05$ ). Thus, the results indicate that the two cookies differ in their lightness ( $L^*$ ), redness ( $a^*$ ), and yellowness ( $b^*$ ). In baking at high temperatures, browning is caused by the Maillard reaction. It was found that the darker surface of cookies resulted from the incorporation of Horse Gram and Black Gram flour (Borrelli et al., 2013) [16].

#### D. Sensory Analysis of the cookies

**Table5:** Sensory Analysis of the cookies

Variable	Cookies	Mean±SD	K-W Value	p-value
Appearance	Control Cookies	3.86±0.77	10.412	.016**
	Gram Cookies	4.60±0.50		
Colour	Control Cookies	4.25±0.44	20.978	.000*
	Gram Cookies	4.40±0.68		
Flavour	Control Cookies	3.93±0.82	8.945	.023**
	Gram Cookies	4.85±0.36		

Taste	Control Cookies	4.33±0.88	7.894	.020**
	Gram Cookies	4.75±0.44		
Texture	Control Cookies	3.46±0.77	20.512	.000*
	Gram Cookies	4.30±0.47		
Overall acceptance	Control Cookies	4.13±0.76	19.926	.001*
	Gram Cookies	4.80±0.41		

\*- Significant at 1% level, \*\*-Significant at 5% level

A panel of judges evaluated sensory parameters such as appearance, taste, colour, texture, flavor, and overall acceptability. The developed Gram cookies were generally well expected, and scores across all parameters were more significant than the minimum acceptable level of the five-point hedonic scale. A Kruskal-Wallis H test indicated that there was a statistically significant difference in appearance, colour, flavour, taste, texture and total acceptability between the two Cookies,  $\chi^2(2) = 10.412, 20.978, 8.945, 7.894, 20.512$  and  $19.926$ ,  $p = 0.016, 0.000, 0.023, 0.020, 0.000$  and  $0.001$ . Thus, the result shows a difference between cookies in all these parameters. The results of (Pestoric et al., 2017) [17] also indicated that altered the acceptability of composite cookies by partially replacing wheat flour with black Gram and horse gram flour.

#### E. Nutrient Analysis of Cookies

The cookies were analysed for their nutritional content, and cookies made from refined wheat flour served as the control sample. Control cookies were made using standard recipes, and Gram cookies were standardised through trial and error. Table 6 shows the results of the nutrient analysis of cookies

**Table 6:** Nutrient analysis of cookies

Nutrients	Cookies	Mean	SD	t-value	p-value
Moisture	Control Cookies	4.81	0.19	36.976	.000*

(%)	Gram Cookies	0.65	0.06		
<b>Ash</b>	Control Cookies	0.96	0.04	-16.734	.000*
(%)	Gram Cookies	1.43	0.03		
<b>Fat</b>	Control Cookies	25.26	0.23	51.962	.000*
(g)	Gram Cookies	17.48	0.13		
<b>Omega3Fatty</b>	Control Cookies	2.55	0.43	-11.543	.000*
<b>Acids(g)</b>	Gram Cookies	6.64	0.44		
<b>Protein</b>	Control Cookies	6.67	0.40	-23.359	.001*
(g)	Gram Cookies	14.60	0.43		
<b>Crude Fibre</b>	Control Cookies	0.26	0.12	-22.312	.002*
(g)	Gram Cookies	5.30	0.35		
<b>Dietary Fibre</b>	Control Cookies	9.41	0.28	-7.316	.003*.
(g)	Gram Cookies	11.58	0.43		
<b>Energy</b>	Control Cookies	514.36	0.31	-79.164	.000*
(Kcal)	Gram Cookies	538.52	0.43		
<b>Carbohydrate</b>	Control Cookies	62.68	0.34	4.091	.015**
(g)	Gram Cookies	61.58	0.32		

\*= Significant at 1% level, NS = Not Significant, \*\*-Significant at 5% level

The nutritional compositions of cookies are given in Table 6. As indicated by the moisture content, Gram cookies were significantly reduced ( $p < 0.05$ ) when Gram cookies were substituted for Control cookies above the 5% level. Bertagnolli et al. (2014) suggest that cookies containing low moisture are more shelf-stable when properly packaged and stored. (e.g. packaging that protects from moisture, gases, and light). Therefore, the use of

horse gram and black gram flour during baking cookies will lead to longer-lasting products since horse gram and black gram flour contain less moisture. [18]

Among cookies with an ash content of 5%, a significant difference was observed ( $p < 0.05$ ) (Table 6). Ash value of  $1.43 \pm 0.03$  was observed in Gram cookies, while the ash content was  $0.96 \pm 0.04$  for Control Cookies. There was a high level of mineral content in the composite cookie samples based on the high ash content. It indicates that cookies made with horse gram and black gram flour mixes contain more minerals than those made with regular flour (Omeire,2010) [6].

The protein content of Gram cookies had the highest range,  $14.60 \pm 0.43$ , while the control cookies had the lowest,  $6.67 \pm 0.40$ . A significant difference in the protein amount of the cookies was at a 5% level ( $p < 0.05$ ). According to the results, the protein content of cookies made with Horse Gram and Black Gram flours tended to be increasing, almost in line with the findings of (Adebowale et al.,2012) [19].

The difference in fat between Control Cookies and Gram Cookies was not significant ( $p > 0.05$ ). The Gram Cookies had the lowest fat content,  $17.48 \pm 0.13$ , while the Control cookies had the highest fat content,  $25.26 \pm 0.23$ . The fat content gives the cookies a high kilocalorie value and serves as a lubricant to enhance the taste and texture of the product. It is also a rich source of calories. It serves as a transporter for lipid-soluble vitamins, such as A, D, E and K. In addition, fat content in foodstuffs should not exceed 25% because it can cause deterioration and the formation of unhealthy and toxic chemicals. (Ikuomola,2017) [8]. The presence of Omega3 fatty acids in the prepared cookies can be linked to Gram cookies concentrate, which had the maximum value of 6.64 and the lowest value of 2.55. These fatty acids can help promote genes involved in stimulating neuronal activity and enhancing cognitive functioning in humans. (Lange, 2020) [1 ]

The crude fibre and dietary fibre content of cookies produced from Gram Cookies had the highest values,  $5.30 \pm 0.35$  and  $11.58 \pm 0.43$ , while the Control Cookies had the lowest values,  $0.26 \pm 0.12$  and  $9.41 \pm 0.28$ . There was a statistically significant difference in Crude Fibre and Dietary Fibre between Control Cookies and Gram Cookies ( $p < 0.05$ ). The results obtained for the cookie samples are justified because horse gram and black gram flour have a higher crude fibre and dietary fibre content than wheat flour. The high fibre content in food products is critical since it facilitates bowel movements (peristalsis), bulks up food, and prevents many gastrointestinal conditions in humans (Ajila et al., 2008)[20]

Carbohydrates present in Gram Cookies had the lowest carbohydrate content,  $61.58 \pm 0.32$ , whereas Standard Cookies had the highest value,  $62.68 \pm 0.34$ . It was not observed a significant difference between Control

Cookies and Gram Cookies ( $p > 0.05$ ). The low glycemic index of the composite cookies and their high fibre content makes them healthy. It promotes digestion and reduces constipation, often caused by foods made from whole pulse flours. (Kuchtova *et al.*, 2018) [11].

Gram Cookies had the highest energy value,  $538.52 \pm 0.43$ , while the Control Cookies had the lowest,  $514.36 \pm 0.31$ . Compared with the Control cookies, the composite cookies had no significantly different energy values ( $p > 0.05$ ). The blend's protein, fat, and carbohydrate constituents contributed to the cookies energy value. Cookies are an energy-giving food that is primarily eaten between meals by children and adults alike. The consumption of horse and black gram flour could contribute to higher levels of protein and fibre in cookies (Adeola, 2018) [21].

#### F. Vitamin and Mineral Analysis:

Cookies can provide minerals and vitamins to ADHD children with their needs. Since 100 g of the Gram cookies provided from calcium (67.38mg), iron (6.44mg), phosphorus (280.51mg), magnesium (96.40mg) and zinc (16.08mg), respectively from daily requirement compared with the control cookies calcium (21.30mg), iron (2.17mg), phosphorus (178.62 mg), magnesium (31.24mg), and zinc (4.36mg). The calcium, magnesium, and zinc levels in Control Cookies and Gram Cookies were significantly different ( $p < 0.05$ ). Kapil and Bhavna have reported the association between micronutrients and brain function. Pollitt suggests that iron deficiency anaemia is associated with low educational achievement among children. Lack of minerals is related to low absorption of minerals during childhood development or the poor retention of minerals from eating habits. Many nutrition survey data illustrated that the children do not get their minerals and vitamins to improve brain health and educational performance. (Swaminathan, 2013) [22]. Gram cookies contain vitamin B<sub>6</sub> and Vitamin C due to the presence of horse and black Gram, which includes 0.59 and 4.26, while the control cookies had the lowest values, 0.01 and 2.00. In terms of Vitamin B<sub>6</sub> and Vitamin C, a significant difference ( $p < 0.05$ ) was observed between Control Cookies and Gram Cookies. Vitamin B<sub>6</sub> & C are essential for proper brain development and function (Jannusch, 2017) [23].

**Table 7:** Vitamins and Mineral content of cookies

Constituents	Cookies	Mean	SD	t-value	Sig

<b>Calcium</b> <b>(mg)</b>	Control Cookies	21.30	0.35	-186.338	.000*
	Gram Cookies	67.38	0.24		
<b>Iron</b> <b>(mg)</b>	Control Cookies	2.17	0.43	-13.618	.000*
	Gram Cookies	6.44	0.33		
<b>Phosphorus</b> <b>(mg)</b>	Control Cookies	178.62	0.38	-289.228	.000*
	Gram Cookies	280.51	0.48		
<b>Magnesium</b> <b>(mg)</b>	Control Cookies	31.24	0.23	-252.545	.000*
	Gram Cookies	96.40	0.39		
<b>Zinc</b> <b>(mg)</b>	Control Cookies	4.36	0.33	-42.862	.000*
	Gram Cookies	16.08	0.34		
<b>Vitamin B6</b> <b>(mg)</b>	Control Cookies	0.10	0.17	-18.719	.001*
	Gram Cookies	2.06	0.06		
<b>Vitamin C</b> <b>(mg)</b>	Control Cookies	2.05	0.17	-57.658	.000*
	Gram Cookies	9.15	0.14		

\*= Significant at 1% level, \*\*-Significant at 5% level

#### IV. Conclusion

This study was designed to assess the nutrient content of Gram Cookies which was formulated for ADHD children. The health status of ADHD children claims that the nutrient content is significantly higher in protein, fibre, and vitamin and mineral content. The nutrient content of these cookies is in accordance with the ICMR guidelines. The recommended dietary allowances per day will give one-third of nutrition to ADHD children. It will maintain the health status by promoting the supply of neurotransmitters. This study helps to assess ADHD children and their caregivers, which helps to understand the benefits of nutrition on their health. It was suggested that the prepared snack, in the form of baked cookies, could be safely served as a snack for ADHD children by providing

them with the required macro and micronutrients that reduce the symptoms and improve brain function and educational achievement.

#### ETHICAL APPROVAL

The research design and the protocols used in the study were approved by the Institutional Ethical Committee and Ethical Clearance with a certification AUW/IHEC/FSN-20-21/XPD-27.

#### ACKNOWLEDGEMENTS

The authors wish to record the deep sense of gratitude and profound thanks to the research supervisor and the management of Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, Tamil Nadu, India, for their support.

## REFERENCES

1. Lange KW. Omega-3 fatty acids and mental health, *Global Health Journal* Volume 4, Issue 1, (2020), Pages 18-30. doi.org/10.1016/j.glohj.2020.01.004.
2. Pal Veer et al., Development and quality evaluation of multigrain cookies, *The Pharma Innovation Journal* 2018; 7(7): 1002-1007.
3. Kurniadi et al., Formulation and Shelf Life Prediction of Cookies From Modified Cassava Flour (Mocaf) In Flexible Packaging, *IOP Conf. Series: Earth and Environmental Science* 251 (2019) 012034, doi:10.1088/1755-1315/251/1/012034.
4. Varsha Rani et al., Orange Peel Powder: A Potent Source of Fiber and Antioxidants for Functional Biscuits. *Int.J.Curr.Microbiol.App.Sci.*2020.9(09):1319-1325. DOI: <https://doi.org/10.20546/ijcmas.2020.909.167>
5. Niederhofer et al., Association of Attention-Deficit/Hyperactivity Disorder and Celiac Disease: A Brief Report, *Prim Care Companion CNS Disorder.* 2011; 13(3): PCC.10br01104. DOI: 10.4088/PCC.10br01104
6. Omeire G.C, Ohambele F.I, Production and evaluation of biscuits from composite wheat defatted cashew nut flours, *Nigerian Food Journal*, 2010, Vol. 28 No. 2 DOI: 10.4314/nifoj.v28i2.62674
7. Chopra N, Dhillon B, Rani R, Singh A. Physico-Nutritional and Sensory Properties of Cookies Formulated with Quinoa, Sweet Potato and Wheat Flour Blends. *Current Research Nutrition Food Science* 2018;6(3). DOI:<http://dx.doi.org/10.12944/CRNFSJ.6.3.22>
8. Ikuomola D.S., Otutu O.L. & Oluniran D.D., Quality assessment of cookies produced from wheat flour and malted barley (*Hordeum vulgare*) bran blends, *Cogent Food & Agriculture*, 2017,3:1, 1293471, DOI: 10.1080/23311932.2017.1293471
9. AACC. (2000). *Approved methods of the American Association of cereal chemists* (17th ed.). St. Paul, MN: Author.
10. Li et al., Digestibility, textural and sensory characteristics of cookies made from residues of enzyme-assisted aqueous extraction of soybeans, *Scientific Reports*,(2020),10:4222,doi.org/10.1038/s41598-020-61179-9

11. Veronika Kuchtova, Zlatica Kohajdova, Jolana Karovicova, Michaela Laukova, Physical, Textural and Sensory Properties of Cookies Incorporated with Grape Skin and Seed Preparations, Polish Journal of Food Nutrition and Sciences., 2018, Vol. 68, No. 4, pp. 309–317 DOI: 10.2478/pjfn-2018-0004.
12. AOAC, Official methods of analysis of the association of official analytical chemists” In: W Horowitz, Editor, Official methods of analysis, 18th ed. Gaithersburg, MD, USA; 2005.
13. Ho et al., Nutritional composition, physical properties, and sensory evaluation of cookies prepared from wheat flour and pitaya (*Hylocereus undatus*) peel flour blends, Cogent Food & Agriculture (2016), 2: 1136369, <http://dx.doi.org/10.1080/23311932.2015.1136369>.
14. Azza A Omran, Ola S Ibrahim, Zahrat El-Ola M Mohamed, QUALITY CHARACTERISTICS OF BISCUIT PREPARED FROM WHEAT AND FLAXSEED FLOUR, Advances in Food Sciences, Volume 38 -No. 4,2016, pg129-138
15. Kulthe, A.A.; Thorat, S.S.; Lande, S.B. Evaluation of physical and textural properties of cookies prepared from pearl millet flour. Int. J. Curr. Microbiol. Appl. Sci. 2017, 6, 692–701.
16. Borrelli, R.C.; Mennella, C.; Barba, F.; Russo, M.; Russo, G.L.; Krome, K.; Erbersdobler, H.F.; Faist, V.; Fogliano, V. Characterization of coloured compounds obtained by enzymatic extraction of bakery products. Food Chem. Toxicol. 2013, 41, 1367–1374.
17. Mladenka Pestic, Dubravka Skrobot, Uros Zigon, Olivera Simurina, Bojana Filipcev, Miona Belovic & Aleksandra Misan, Sensory profile and preference mapping of cookies enriched with medicinal herbs, International Journal of Food Properties, 2017, 20:2, 350-361, DOI: 10.1080/10942912.2016.1160922
18. Silvana Maria Michelin Bertagnolli<sup>1</sup>, Marcia Liliane Rippel Silveira, Aline De Oliveira Fogaca, Liziane Umann, Heidi Garcia Penna, Bioactive compounds and acceptance of cookies made with Guava peel flour, Food Science and Technology, 2014, ISSN 0101-2061, 34(2): 303-308, [doi.org/10.1590/fst.2014.0046](http://doi.org/10.1590/fst.2014.0046)
19. Abdul-Rasaq Adebawale, Adegoke M.T., Sanni S.A., Mojisola Olanike Adegunwa, Ganiyat Olatunde, Functional Properties and Biscuit Making Potentials of Sorghum-wheat Flour Composite, American Journal of Food Technology, 2012, 7(6):372-379 DOI: 10.3923/ajft.2012.372.379
20. Ajila, C.M.; Leelavathi, K.; Prasada Rao, U.J.S. Improvement of dietary fibre content and antioxidant properties in soft dough biscuits with the incorporation of mango peel powder. J. Cereal Sci. 2008, 48, 319–326

21. Abiodun A. Adeola, Ehimen R. Ohizua, Physical, chemical, and sensory properties of biscuits prepared from flour blends of unripe cooking banana, pigeon pea, and sweet potato, Food Science and Nutrition. 2018;1–9, DOI: 10.1002/fsn3.590
22. Swaminathan S, Edward BS & Kurpad AV, Micronutrient deficiency and cognitive and physical performance in Indian children, 2013, European Journal of Clinical Nutrition volume 67, pages 467–474.
23. Kai Jannusch, Christiane Jockwitz, Hans-Jurgen Bidmon, Susanne Moebus, Katrin Amunts and Svenja Caspers, A Complex Interplay of Vitamin B1 and B6 Metabolism with Cognition, Brain Structure, and Functional Connectivity in Older Adults, Frontiers in Neuroscience, Volume 11, article 596, doi.org/10.3389/fnins.2017.00596

#### AUTHORS

**First Author** – S. SOUNDARIYA, Ph.D. Food Science and Nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, India-43, and [19phfnf003@avinuty.ac.in](mailto:19phfnf003@avinuty.ac.in)

**Second Author** – C.A. Kalpana, Professor, department of food science and nutrition, Avinashilingam Institute for Home Science and Higher Education for Women, Coimbatore, India-43 and [Kalpana\\_fsn@avinuty.ac.in](mailto:Kalpana_fsn@avinuty.ac.in)

**Correspondence Author** – S. SOUNDARIYA, [19phfnf003@avinuty.ac.in](mailto:19phfnf003@avinuty.ac.in) and [soundariya2314@gmail.com](mailto:soundariya2314@gmail.com), 6383560148