BIBLIOGRAPHY

1. Abdullah, M., Yoke, S. K., Raofuddin, D. N. A., Sukor, M. Z., Roslan, A., Ilyas, S. M. M., & Yasin, M. H. (2018). An evaluation of eggshell waste/waste paper mechanical properties as composite paper. *Int. J. Eng. Technol*, *7*, 239-241.
2. Abdulrahman I, Tijani HI, Mohammed B A, Saidu H, Yusuf H, NdejikoJibrin M, Mohammed S. (2014). From Garbage to Biomaterials: An Overview on Egg Shell Based Hydroxyapatite. Journal of Materials, 2014, 1-6.
3. Abraham, G. E. (2001). The importance of magnesium in the management of primary postmenopausal osteoporosis. Journal of Nutritional Medicine, 2(2), 165-178.
4. Adler, R.A. (2016). Bisphosphonates and atypical femoral fractures. *Current Opinion in Endocrinology, Diabetes and Obesity*, *23*(6), 430-434.
5. Afshan, S., Musa, A. R. F., Echols, V., Lerant, A. A., & Fülöp, T. (2017). Persisting hypocalcemia after surgical parathyroidectomy: The differential effectiveness of calcium citrate versus calcium carbonate with acid suppression. *The American Journal of the Medical Sciences*, *353*(1), 82-86.
6. Agarwal, A. K., Kiron, N., Gupta, R., & Sengar, A. (2019). A cross sectional study for assessment of menopausal symptoms and coping strategies among the women of 40-60 years age group attending outpatient clinic of gynaecology. *International Journal of Medicine and Public Health*, *9*(1).
7. Agarwal, N., Mithal, A., Dhingra, V., Kaur, P., Godbole, M. M., & Shukla, M. (2013). Effect of two different doses of oral cholecalciferol supplementation on serum 25-hydroxy-vitamin D levels in healthy Indian postmenopausal women: A randomized controlled trial. *Indian Journal of Endocrinology and Metabolism*, *17*(5), 883.
8. Aggarwal, N., Raveendran, A., Khandelwal, N., Sen, R. K., Thakur, J. S., Dhaliwal, L. K., & Manoharan, S. R. R.(2011). Prevalence and related risk factors of osteoporosis in peri-and postmenopausal Indian women. *Journal of mid-Life health*, *2*(2), 81.
9. Agrawal, N. K., & Sharma, B. (2013). Prevalence of osteoporosis in otherwise healthy Indian males aged 50 years and above Arch Osteoporosis.
10. Ahmed, T. A., Suso, H. P., Maqbool, A., & Hincke, M. T. (2019). Processed eggshell membrane powder: Bioinspiration for an innovative wound healing product. *Materials Science and Engineering: C*, *95*, 192-203.
11. Ajala, E. O., Eletta, O. A. A., Ajala, M. A., & Oyeniyi, S. K. (2018). Characterization and evaluation of chicken eggshell for use as a bio-resource. *Arid Zone Journal of Engineering, Technology and Environment*, *14*(1), 26-40.
12. Alan D Rogol, Pamela A Clark, and James N Roemmich, (2000). Growth and pubertal development in children and adolescents: effects of diet and physical activity, Am J ClinNutr;72(suppl):521S-8S.
13. Al-Ayyadhi, N., Refaat, L. A. E., Ibrahim, M. M., & Abd ElGalil, H. M. (2020). Screening for Bone Mineral Density and Assessment Knowledge Level of Low Peak Bone Risk Factors and Preventive Practices Among Kuwaiti Future Mothers. *Journal of Multidisciplinary Healthcare*, *13*, 1983.
14. Al-Homood IA, Sheshah I, Mohammed AGA, Gasim GI. The prevalence and risk factors of osteoporosis among a Saudi female diabetic population. *Open Access Maced J Med Sci.* 2017;5(2):177-181.
15. Alsuhaibani A M A (2018). Rheological and Nutritional Properties and Sensory Evaluation of Bread Fortified with Natural Sources of Calcium. Journal of Food Quality, *2018*.
16. Alswat, K. A. (2017). Gender disparities in osteoporosis. *Journal of clinical medicine research*, *9*(5), 382.
17. Ameh M O, GernahD I, and IgbabulB D (2013). Physico-chemical and sensory evaluation of wheat bread supplemented with stabilized undefatted rice bran. Food and Nutrition Sciences, 4, 43-48.
18. Amicosante AMV, Bernardini F, Cavallo A, Cerbo M, Jefferson T, Lo Scalzo A, Ratti M. Agenas HTA Report - Technologies for the identification of osteoporosis. Rome.2009.
19. Amu OO, Fajobi AB, Oke BO (2005). Effect of eggshell powder on the stabilization potential of lime on an expansive clay soil. Research Journal Agriculture and Biological Science, 1, 80-84.
20. Anderson, G. L., Chlebowski, R. T., Aragaki, A. K., Kuller, L. H., Manson, J. E., Gass, M., & Wactawski-Wende, J. (2012). Conjugated equine oestrogen and breast cancer incidence and mortality in postmenopausal women with hysterectomy: extended follow-up of the Women's Health Initiative randomised placebo-controlled trial. *The lancet oncology*, *13*(5), 476-486.

21. Anderson, J. J., Roggenkamp, K. J., & Suchindran, C. M. (2012). Calcium intakes and femoral and lumbar bone density of elderly US men and women: National Health and Nutrition Examination Survey 2005-2006 analysis. *The Journal of Clinical Endocrinology & Metabolism*, *97*(12), 4531-4539.
22. Ángeles-Llerenas, A., Ortega-Olvera, C., Pérez-Rodríguez, E., Esparza-Cano, J. P., Lazcano-Ponce, E., Romieu, I., & Torres-Mejía, G. (2010). Moderate physical activity and breast cancer risk: the effect of menopausal status. *Cancer Causes & Control*, *21*(4), 577-586
23. Anjana, R. M., Pradeepa, R., Das, A. K., Deepa, M., Bhansali, A., Joshi, S. R.,& Shukla, D. K. (2014). Physical activity and inactivity patterns in India-results from the ICMR-INDIAB study (Phase-1)[ICMR-INDIAB-5]. *International Journal of Behavioral Nutrition and Physical Activity*, *11*(1), 1-11.
24. Annamalai, R., & Lal, J. S. (2018).Correlation of anthropometric measurements with bone mineral density in south Indian population. *Int J Orthop Sci*, *4*(1), 221-24.
25. Ardawi, M. S., Qari, M. H., Rouzi, A. A., Maimani, A. A., & Raddadi, R. M. (2011). Vitamin D status in relation to obesity, bone mineral density, bone turnover markers and vitamin D receptor genotypes in healthy Saudi pre-and postmenopausal women. *Osteoporosis international*, *22*(2), 463-475.
26. Ariefdjohan MW et al. (2008) Acute and chronic effects of honey and its carbohydrate constituents on calcium absorption in rats. *Journal of agricultural and food chemistry*; 56(8): 2649-2654.
27. Arif, S., Pasha, I., Iftikhar, H., Mehak, F., & Sultana, R. (2022). Effects of eggshell powder supplementation on nutritional and sensory attributes of biscuits. *Czech Journal of Food Sciences*, *40*(1), 26-32.
28. Arjmandi, B. H., Lucas, E. A., Khalil, D. A., Devareddy, L., Smith, B. J., McDonald, J., & Mason, C. (2005). One year soy protein supplementation has positive effects on bone formation markers but not bone density in postmenopausal women. *Nutrition Journal*, *4*(1), 1-9.
29. Asada, N., Sato,M.,&Katayama,Y(2015).Communication of bone cells with hematopoiesis, immunity and energy metabolism. *BoneKEy reports*, 4:748.
30. Asia pacific classification of bmi-Lim, J. U., Lee, J. H., Kim, J. S., Hwang, Y. I., Kim, T. H., Lim, S. Y.,& Rhee, C. K. (2017). Comparison of World Health Organization and Asia-Pacific body mass index classifications in COPD patients. *International journal of chronic obstructive pulmonary disease*, *12*, 2465.
31. Avenell A, Mak JC, O'Connell D. (2014) Vitamin D and vitamin D analogues for preventing fractures in post-menopausal women and older men. *Cochrane Database Syst Rev*;(4):CD000227
32. Babatunde, O. T., Marquez, S., & Taylor, A. (2017). Osteoporosis knowledge and health beliefs among men in midlife years. *Journal of nutrition education and behavior*, *49*(9), 759-763.
33. Baker, N. L., Cook, M. N., Arrighi, H. M., & Bullock, R. (2011). Hip fracture risk and subsequent mortality among Alzheimer's disease patients in the United Kingdom, 1988-2007 Age and ageing, 40(1), 49-54.
34. Balk, E. M., Adam, G. P., Langberg, V. N., Earley, A., Clark, P., Ebeling, P. R & Dawson-Hughes, B. (2017). Global dietary calcium intake among adults: a systematic review. *Osteoporosis international*, *28*(12), 3315-3324.
35. Barry, M., Pearce, H., Cross, L., Tatullo, M., & Gaharwar, A. K. (2016). Advances in Nanotechnology for the Treatment of Osteoporosis. Current osteoporosis reports, 14(3), 87-94.
36. Bass S.L. The prepubertal years. *Sports Medicine*. 2000; 30(2): 73-78.
37. Bauer, J., Biolo, G., Cederholm, T., Cesari, M., Cruz-Jentoft, A. J., Morley, J. E., & Boirie, Y. (2013). Evidence-based recommendations for optimal dietary protein intake in older people: a position paper from the PROT-AGE Study Group. Journal of the american Medical Directors association, 14(8), 542-559..
38. Beasley, J. M., Ichikawa, L. E., Ange, B. A., Spangler, L., LaCroix, A. Z., Ott, S. M., & Scholes, D. (2010). Is protein intake associated with bone mineral density in young women. *The American journal of clinical nutrition*, *91*(5), 1311-1316.
39. Bennell, K. L., Malcolm, S. A., Khan, K. M., Thomas, S. A., Reid, S. J., Brukner, P. D.,& Wark, J. D. (1997). Bone mass and bone turnover in power athletes, endurance athletes, and controls a 12-month longitudinal study. Bone, 20(5), 477-484.
40. Bess Dawson-Hughes, M. D. (2022).Vitamin D deficiency in adults: Definition, clinical manifestations, and treatment.
41. Beyazal, M., Capkin, E., Karkucak, M., Guler, M., Cakirbay, H., &Tosun, M. (2016). The relationship of osteoporosis risk factors with bone mineral density in patients admitted our outpatient clinic in Trabzon. *Turk Osteoporoz Dergisi-Turkish Journal of Osteoporosis*, *22*(1).

42. Bhadada, S. K., Sridhar, S., Muthukrishnan, J., Mithal, A., Sharma, D. C., Bhansali, A., & Dhiman, V. (2014). Predictors of atypical femoral fractures during long term bisphosphonate therapy: a case series & review of literature. The Indian Journal of Medical Research, 140(1), 46.
43. Bihuniak, J. D., & Insogna, K. L. (2015). The effects of dietary protein and amino acids on skeletal metabolism. *Molecular and cellular endocrinology*, 410, 78-86.
44. Bischoff-Ferrari HA, Dawson-Hughes B, Orav EJ, et al.,(2016). Monthly High-Dose Vitamin D Treatment for the Prevention of Functional Decline: A Randomized Clinical Trial. *JAMA Intern Med*;176(2):175.
45. Bischoff-Ferrari, H. A. (2008). Optimal serum 25-hydroxyvitamin D levels for multiple health outcomes. Sunlight, Vitamin D and Skin Cancer, 55-71.
46. Bischoff-Ferrari, H. A., Willett, W. C., Wong, J. B., Giovannucci, E., Dietrich, T., & Dawson-Hughes, B. (2005). Fracture prevention with vitamin D supplementation: a meta-analysis of randomized controlled trials. Jama, 293(18), 2257-2264.
47. Bitar, A. N., Sulaiman, S. A. S., Ali, I. A. H., Khan, I., & Khan, A. H. (2019). Osteoporosis among patients with chronic obstructive pulmonary disease: Systematic review and meta-analysis of prevalence, severity, and therapeutic outcomes. Journal of pharmacy & bioallied sciences, 11(4), 310.
48. Blazer, D. G., & Hernandez, L.M. (Eds.). (2006). Genes, behavior, and the social environment: Moving beyond the nature/nurture debate.
49. Blekkenhorst, L.C., Prince, R.L., Ward, N.C., Croft, K.D., Lewis, J.R., Devine, A & Bondonno, C.P. (2017). Development of a reference database for assessing dietary nitrate in vegetables. Molecular nutrition & food research, 61(8), 1600982.
50. Bolland, M. J., Avenell, A., Baron, J. A., Grey, A., MacLennan, G. S., Gamble, G. D., & Reid, I. R. (2010). Effect of calcium supplements on risk of myocardial infarction and cardiovascular events: meta-analysis. *Bmj*, *341*, c3691.
51. Borer, K. T. (2005). Physical activity in the prevention and amelioration of osteoporosis in women. *Sports medicine*, *35*(9), 779-830.
52. Bostick, R. M., Kushi, L. H., Wu, Y., Meyer, K. A., Sellers, T. A., & Folsom, A. R. (1999). Relation of calcium, vitamin D, and dairy food intake to ischemic heart disease mortality among postmenopausal women. *American journal of epidemiology*, *149*(2), 151-161.
53. Bouillon R, Burckhardt P, Christiansen C, et al. Consensus development conference: prophylaxis and treatment of osteoporosis. *Am J Med*. 1;9 2001:107-110.
54. Bouxsein, M. L., & Seeman, E. (2009). Quantifying the material and structural determinants of bone strength. *Best practice & research Clinical rheumatology*, *23*(6), 741-753.
55. Boyle, J. P., Thompson, T. J., Gregg, E. W., Barker, L. E., & Williamson, D. F. (2010). Projection of the year 2050 burden of diabetes in the US adult population: dynamic modeling of incidence, mortality, and prediabetes prevalence. Population health metrics, 8(1), 1-12.
56. Bose, S., Sarkar, N., & Banerjee, D. (2020). Controlled Delivery of Natural Medicinal Compounds from Tissue Engineering Scaffolds for Critical-Sized Bone Defect Repair. *Available at SSRN* 3708576.
57. Bradauskiene V, Montrimaite K, Moscenkova E (2017). Facilities of bread enrichment with calcium by using eggshell powder. Conference: 11th Baltic Conference on Food Science and Technology “Food science and technology in a changing world, 11, 1-95.
58. Briot, K., & Roux, C. (2015). Inflammation, bone loss and fracture risk in spondyloarthritis. RMD open, 1(1), e000052.
59. Brown, J. P., Morin, S., Leslie, W., Papaioannou, A., Cheung, A. M., Davison, K. S., & Adachi, J. (2014). Bisphosphonates for treatment of osteoporosis: expected benefits, potential harms, and drug holidays. Canadian Family Physician, 60(4), 324-333.
60. Browner, W. S., Pressman, A. R., Nevitt, M. C., & Cummings, S. R. (1996). Mortality following fractures in older women: the study of osteoporotic fractures. Archives of internal medicine, 156(14), 1521-1525.
61. Brun, L. R., Lupo, M., Delorenzi, D. A., Di Loreto, V. E., & Rigalli, A. (2013). Chicken eggshell as suitable calcium source at home. *International journal of food sciences and nutrition*, *64*(6), 740-743.
62. Burckhardt, P. (2001). Modifiable risk factors of osteoporosis. Osteoporos. Int, 12, 59-64.
63. Butusov, M., & Jernelöv, A. (2013). *Phosphorus: An element that could have been called Lucifer* (Vol. 9). Springer Science & Business Media.

64. Cadarette, S. M., Jaglal, S. B., Kreiger, N., McIsaac, W. J., Darlington, G. A., & Tu, J. V. (2000). Development and validation of the Osteoporosis Risk Assessment Instrument to facilitate selection of women for bone densitometry. *Cmaj*, *162*(9), 1289-1294.
65. Cano, A., Chedraui, P., Goulis, D. G., Lopes, P., Mishra, G., Mueck, A., & Lambrinoudaki, I. (2018). Calcium in the prevention of postmenopausal osteoporosis: EMAS clinical guide. Maturitas, 107, 7-12.
66. Carter, D. R., & Beaupré, G. S. (2007). Skeletal function and form: mechanobiology of skeletal development, aging, and regeneration. Cambridge university press.
67. Carter, M. I., & Hinton, P. S. (2014). Physical activity and bone health. *Missouri medicine*, *111*(1), 59
68. Cauley JA, Barbour KE, Harrison SL, Cloonan YK, Danielson ME, Ensrud KE, Fink HA, Orwoll ES, Boudreau R. (2016).Inflammatory Markers and the Risk of Hip and Vertebral Fractures in Men: the Osteoporotic Fractures in Men (MrOS) *J Bone Miner Res.*;31:2129-2138.
69. Chaemsanit S, Akbar A, Kumar Anal A. (2015). Isolation of total aerobic and pathogenic bacteria from table eggs and its contents. Food and Applied Bioscience Journal, 3(1), 1-9.
70. Chan, R., Chan, D., & Woo, J. (2013). A cross sectional study to examine the association between dietary patterns and cognitive impairment in older Chinese people in Hong Kong. The journal of nutrition, health & aging, 17(9), 757-765.
71. Chatterton B, Schultz C. Bone Densitometry-A user's guide with notes on Investigation and Management of Osteoporosis.
72. Chen, P., Li, Z., & Hu, Y. (2016). Prevalence of osteoporosis in China: a meta-analysis and systematic review. *BMC public health*, *16*(1), 1-11.
73. Chen, Y. W., Ramsook, A. H., Coxson, H. O., Bon, J., & Reid, W. D. (2019). Prevalence and risk factors for osteoporosis in individuals with COPD: a systematic review and meta-analysis. Chest, 156(6), 1092-1110.
74. Chevalley, T., Rizzoli, R., &Nydegger, V. (2004). Effects of calcium supplements on femoral bone mineral density and vertebral fracture rate in vitamin D replete elderly patients. Osteoporosis Int, 4, 245-252.
75. Chevalley, Thierry & Hoffmeyer, Pierre & Bonjour, jean-philippe & Rizzoli, René. (2009). Early serum IGF-I response to oral protein supplements in elderly women with recent hip fracture. Clinical nutrition (Edinburgh, Scotland). 29. 78-83. 10.1016/j.clnu.2009.07.003.
76. Chung, J. H., Biesiadecki, B. J., Ziolo, M. T., Davis, J. P., & Janssen, P. M. (2016). Myofilament calcium sensitivity: role in regulation of in vivo cardiac contraction and relaxation. *Frontiers in physiology*, 7, 562.
77. Clowes, J. A., Peel, N. F. A., & Eastell, R. (2006). Device-specific thresholds to diagnose osteoporosis at the proximal femur: an approach to interpreting peripheral bone measurements in clinical practice. *Osteoporosis international*, *17*(9), 1293-1302.
78. COHAB initiative-corporation of health and biodiversity., (2010).
79. Cohen, J. E., Wakefield, C. E., & Cohn, R. J. (2016). Nutritional interventions for survivors of childhood cancer. Cochrane Database of Systematic Reviews, (8).
80. Collet, C., Ostertag, A., Ricquebourg, M., Delecourt, M., Tueur, G., Isidor, B., & Cohen-Solal, M. (2018). Primary osteoporosis in young adults: genetic basis and identification of novel variants in causal genes. JBMR plus, 2(1), 12-21.
81. Committee to Review Dietary Reference Intakes for Vitamin D and Calcium 2010 Dietary Reference Intakes for Calcium and Vitamin D. Institute of Medicine, Washington, DC, USA.
82. Compston, J. (2020). Reducing the treatment gap in osteoporosis. *The Lancet Diabetes & Endocrinology*, *8*(1), 7-9.
83. Compston, J. E., Laskey, M. A., Croucher, P. I., Coxon, A., & Kreitzman, S. (2002). Effect of diet-induced weight loss on total body bone mass. Clinical science (London, England: 1979), 82(4), 429-432.
84. Compston, J. E. (2005). The role of vitamin D and calcium supplementation in the prevention of osteoporotic fractures in the elderly. Clinical Endocrinology, 43(4), 393-405.
85. Compston, J., Bowring, C., Cooper, A., Cooper, C., Davies, C., Francis, R., Kanis, J. A., Marsh, D., McCloskey, E. V., Reid, D. M., Selby, P., &National Osteoporosis Guideline Group. Diagnosis and management of osteoporosis in postmenopausal women and older men in the UK: National Osteoporosis Guideline Group (NOGG)update2013. (2013). Maturitas, 75(4), 392-396.
86. Connelly, L. M. (2013). Demographic data in research studies. *Medsurg Nursing*, *22*(4), 269-271.
87. Cooper, C., &Melton, L. J., 3rd (2002). Epidemiology of osteoporosis. Trends in Endocrinology and Metabolism, 3(6), 224-229.

88. Cosman, F.S. J. de Beur, M. S. LeBoff, E. M. Lewiecki, B. Tanner, S. Randall, and R. Lindsay, (2014), Clinician's Guide to Prevention and Treatment of Osteoporosis, Osteoporosis international; 25(10): 2359-2381.،
89. Cowan, P. T., &Kahai, P. Anatomy, Bones Cowan, P. T., &Kahai, P. (2021). Anatomy, Bones.
90. Craig, C. L., Marshall, A. L., Sjöström, M., Bauman, A. E., Booth, M. L., Ainsworth, B. E., & Oja, P. (2003). International physical activity questionnaire: 12-country reliability and validity. Medicine and science in sports and exercise, 35(8), 1381-1395.
91. Curtis, E. M., Moon, R. J., Harvey, N. C., & Cooper, C. (2017). Reprint of the impact of fragility fracture and approaches to osteoporosis risk assessment worldwide. International journal of orthopaedic and trauma nursing, 26, 7-17.
92. Czernichow, S., Fan, T., Nocea, G. and Sen, S.S. 2010. Calcium and vitamin D intake by postmenopausal women with osteoporosis in France. Curr. Med. Res. Opin. 26, 1667- 74.
93. D'Amelio, P., &Isaia, G. C.(2015). Male osteoporosis in the elderly. InternationalJournal of Endocrinology, 2015, 907689
94. Daengprok W, Garnjanagoonchorn W, Naivikul O, Pornsinlpatip P, Issigonis K, and Mine Y (2003). Chicken eggshell matrix proteins enhance calcium transport in the human intestinal epithelial cells, Caco-2. Journal of Agricultural and Food Chemistry, 51 (20), 6056-6061.
95. Daly, R. M., & Bass, S. L. (2006). Lifetime sport and leisure activity participation is associated with greater bone size, quality and strength in older men. *Osteoporosis international*, *17*(8), 1258-1267.
96. Daly, R. M., Dalla Via, J., Duckham, R. L., Fraser, S. F., & Helge, E. W. (2019). Exercise for the prevention of osteoporosis in postmenopausal women: an evidence-based guide to the optimal prescription. Brazilian journal of physical therapy, 23(2), 170-180.
97. Darling, A. L., Millward, D. J., Torgerson, D. J., Hewitt, C. E., & Lanham-New, S. A. (2009). Dietary protein and bone health: a systematic review and meta-analysis. *The American journal of clinical nutrition*, *90*(6), 1674-1692.
98. *Das J K, Salam R A, Kumar R, and Bhutta Z A (2013). Micronutrient fortification of food and its impact on woman and child health: a systematic review. Systematic Reviews, 2, 67.*
99. Dawson-Hughes B, Heaney RP, Holick MF, et al. (2005) Estimates of optimal vitamin D status. Osteoporos Int 16:713-716
100. Dawson-Hughes, B. (2006). The role of calcium in the treatment of osteoporosis. S. 115961168 (R. Marcus, D. Feldman, & J. Kelsey, Επιμ.). Academic Press.
101. Dawson-Hughes, B., & Harris, S.S. (2002). Calcium intake influences the association of protein intake with rates of bone loss in elderly men and women. *The American journal of clinical nutrition*, *75*(4), 773-779.
102. Dawson-Hughes, B., Dallal, G. E., Krall, E. A., Sadowski, L., Sahyoun, N., &Tannenbaum, S. (2000). A controlled trial of the effect of calcium supplementation on bone density in postmenopausal women. New Engl. J. Med, 323, 878-883.
103. Dawson-Hughes, B., Harris, S. S., Krall, E. A., Dallal, G. E., Falconer, G., & Green, C. (2005). Rates of bone loss in postmenopausal women randomly assigned to one of two dosages of vitamin D. Amer. J. Clin. Nutr, 61, 1140-1145.
104. Dayakar Rao B., Bhaskarachary K., Arlene Christina G.D., Sudha Devi G., Vilas, A. Tonapi, 2017, Nutritional and Health benefits of Millets. ICAR Indian Institute of Millets Research (IIMR) Rajendranagar, Hyderabad, PP 112
105. De Laet, C. E. D. H., Kanis, J. A., Odén, A., Johanson, H., Johnell, O., Delmas, P & Tenenhouse, A. (2005). Body mass index as a predictor of fracture risk: a meta-analysis. Osteoporosis international, 16(11), 1330-1338.
106. De Oliveira Freitas D M , S tampini D uarte Martino H , M achado Rocha Ribeiro S , Gon ç alves Alfenas RC . Calcium ingestion and obesity control. *Nutr Hosp* 2012 ; 27 : 1758 - 71
107. De wit, A. E., Giltay, E. J., de Boer, M. K., Nathan, M., Wiley, A., Crawford, S., & Joffe, H. (2021). Predictors of irritability symptoms in mildly depressed perimenopausal
108. Deborah A. Straub.(2007).Calcium Supplementation in Clinical Practice: A Review of Forms, Doses, and Indications. *Nutrition in Clinical Practice*; 22:286- 296.
109. Del Valle, H. B., Yaktine, A. L., Taylor, C. L., & Ross, A. C. (Eds.). (2011). Dietary reference intakes for calcium and vitamin D.
110. Delitala, A. P., Scuteri, A., & Doria, C. (2020). Thyroid hormone diseases and osteoporosis. *Journal of clinical medicine*, *9*(4), 1034.
111. Demontiero, O., Vidal, C., & Duque, G. (2012). Aging and bone loss: new insights for the clinician. *Therapeutic advances in musculoskeletal disease*, *4*(2), 61-76.

112. Dennison, E. M., Compston, J. E., Flahive, J., Siris, E. S., Gehlbach, S. H., Adachi, J. D., & Glow Investigators. (2012). Effect of co-morbidities on fracture risk: findings from the Global Longitudinal Study of Osteoporosis in Women (GLOW). Bone, 50(6), 1288-1293.
113. Dennison, E. M., Sayer, A. A., & Cooper, C. (2017). Epidemiology of sarcopenia and insight into possible therapeutic targets. *Nature Reviews Rheumatology*, *13*(6), 340-347.
114. Devarajan, A., & Mohanmarugaraja, M. K. (2017). A comprehensive review on Rasam: A South Indian traditional functional food. *Pharmacognosy reviews*, *11*(22), 73.
115. Dietary Assessment Primer, Food Frequency Questionnaire at a Glance, National Institutes of Health, National Cancer Institute.
116. Dietary guidelines for Indians, ICMR, National Institute of Nutrition Hyderabad, second Edition - 2011.
117. Dolan, E., & Sale, C. (2019). Protein and bone health across the lifespan. *Proceedings of the Nutrition Society*, *78*(1), 45-55.
118. Dri N, Brun L, Di Loreto V, Lupo M, Rigalli A (2011) Study of the composition of the eggshell. A low-cost calcium supplements. Bone, 49 (6): 1381-1388.
119. Dupoirieux L, Pourquier D, Souyris F (1995). Powdered eggshell: a pilot study on a new bone substitute for use in maxillofacial surgery. Journal of Cranio-Maxillofacial Surgery, 23(3): 187-94.
120. Duhan, N., Siwach, R. C., Yadav, K., Dahiya, K., Nanda, S., & Sirohiwal, D. (2012). Comparative evaluation of isosorbide mononitrate and alendronate in management of postmenopausal osteoporosis. Archives of gynecology and obstetrics, 285(4), 1019-1023.
121. DVO-Leitlinie 2015 zur Prophylaxe, Diagnostik und Therapie der Osteoporose bei M ä nnern ab dem 60.Lebensjahr und bei postmenopausalen Frauen. S3-Leitlinie des Dachverbands der Deutschsprachigen Wissenschaftlichen Osteologischen Gesellschaften.
122. Ejaz, S., Mahmood, A., Qureshi, M. A., & Ali, M. (2012).Prevalence of osteoporosis and osteopenia among Pakistani pre and post menopausal women. J Dent Med Sci, 2(6), 12-17.
123. Elizabeth, J., Dayananda, G., Satyavati, K., & Kumar, P. (2009). Bone mineral density in healthy south Indian men. JPBS, 22, 41-3.
124. Embling, R., Pink, A. E., Gatzemeier, J., Price, M., D Lee, M., & Wilkinson, L. L. (2021). Effect of food variety on intake of a meal: a systematic review and meta-analysis. The American journal of clinical nutrition, 113(3), 716-741.
125. Eugene McCloskey. FRAX® Identifying people at high risk of fracture WHO Fracture Risk Assessment Tool, a new clinical tool for informed treatment decisions. International Osteoporosis Foundation 2009.
126. Eva Warensjo, Liisa Byberg, Hakan Melhus, Rolf Gedeborg,Hans Mallmin, Alicja Wolk, Karl Michaelsson. Dietary calcium intake and risk of fracture and osteoporosis: prospective longitudinal cohort study. BMJ 2011;342:d1473.
127. *Evatt, M. L., DeLong, M. R., Khazai, N., Rosen, A., Triche, S., & Tangpricha, V. (2008). Prevalence of vitamin D insufficiency in patients with Parkinson disease and Alzheimer disease. Archives of neurology, 65(10), 1348-1352.*
128. FAO. 2018. Dietary Assessment: A resource guide to method selection and application in low resource settings. Rome.
129. Food and Agriculture Organisation of the United Nations, World Health Organisation 2002 Human vitamin and mineral requirments. Report of a joint FAO/WHO expert consultation,
130. Food and Nutrition Board and Institute of Medicine Standing Committee on the Scientific Evaluation of Dietary Reference Intakes 1997 Dietary Reference Intakes for Calcium, Phosphorous, Magnesium, Vitamin D and Fluoride. In National Academy Press, ed. Washington, DC, USA.
131. Fujita, T., Fukase, M., Miyamoto, H., Matsumoto, T., &Ohue, T. (2010). Increase of bone mineral density by calcium supplement with oyster shell electrolysate. Bone and Mineral, 11(1), 85-91.
132. Furler, J., Magin, P., Pirotta, M., & van Driel, M. (2012). Participant demographics reported in “Table 1”of randomized controlled trials: A case of “inverse evidence”? International Journal for Equity in Health, 11, 14.
133. Gallaghera, J. C., & Tella, S. H. (2013). Anti-resorptive therapy for preventing bone loss: When to use one or two anti-resorptive agents. Clinical obstetrics and gynecology, 56(4), 749.
134. Gambacciani, M., & Levancini, M. (2014). Hormone replacement therapy and the prevention of postmenopausal osteoporosis. *Menopause Review/Przegląd Menopauzalny*, *13*(4), 213-220.
135. Ganpule, A., Yajnik, C. S., Fall, C. H. D., Rao, S., Fisher, D. J., Kanade, A., & Joglekar, C. (2006). Bone mass in Indian children-relationships to maternal nutritional status and diet during pregnancy: the Pune Maternal Nutrition Study. *The Journal of Clinical Endocrinology & Metabolism*, *91*(8), 2994-3001.

136. Garnjanagoonchorn W, Changpuak A (2007). Preparation and partial characterization of eggshell calcium chloride. International Journal of Food Properties, 10(3): 497-503.
137. General, R. (2011). Census Commissioner, India. *Census of India*, *2000*.
138. Geovana D, Savil T, Bortolott L, Roque S, Tatiana B (2011). Elimination of Salmonella enteric serovar Typhimurium in artificially contaminated eggs through con-ect cooking and frying procedures Ciénc. Tecnol. Aliment, Campinas, 31(2):492-496.
139. Ghozlani, I., Ghazi, M., Nouijai, A., Mounach, A., Rezqi, A., Achemlal, L., & El Maghraoui, A. (2009). Prevalence and risk factors of osteoporosis and vertebral fractures in patients with ankylosing spondylitis. *Bone*, *44*(5), 772-776.
140. Godfrey, K. M., Sheppard, A., Gluckman, P. D., Lillycrop, K. A., Burdge, G. C., McLean, C., & Hanson, M. A. (2011). Epigenetic gene promoter methylation at birth is associated with child's later adiposity. *Diabetes*, *60*(5), 1528-1534.
141. Gonzalez, M. C., Correia, M. I. T., & Heymsfield, S. B. (2017). A requiem for BMI in the clinical setting. *Current opinion in clinical nutrition and metabolic care*, *20*(5), 314-321.
142. Gonzalez, Y., Herrera, M. T., Soldevila, G., Garcia-Garcia, L., Fabián, G., Pérez-Armendariz, E. M., & Torres, M. (2012). High glucose concentrations induce TNF-α production through the down-regulation of CD33 in primary human monocytes. *BMC immunology*, *13*(1), 1-14.
143. Gopinathan, N. R., Sen, R. K., Behera, P., Aggarwal, S., Khandelwal, N., & Sen, M. (2016). Awareness of osteoporosis in postmenopausal Indian women: An evaluation of Osteoporosis Health Belief Scale. *Journal of mid-life health*, *7*(4), 180.
144. Government of India: Ministry of Women and Child Development 2009.*Revised Nutritional and Feeding Norms for Supplementary nutrition in ICDS Scheme.*
145. Gracia, C. R., Sammel, M. D., Freeman, E. W., Lin, H., Langan, E., Kapoor, S., & Nelson, D. B. (2005). Defining menopause status: creation of a new definition to identify the early changes of the menopausal transition. *Menopause*, *12*(2), 128-135.
146. Greendale, G. A., Hogan, P., Kritz-Silverstein, D., Langer, R., Johnson, S. R., & Bush, T. (1995). Age at menopause in women participating in the postmenopausal estrogen/progestins interventions (PEPI) trial: an example of bias introduced by selection criteria. *Menopause*, *2*(1), 27-34.
147. Grossman, D. C., Curry, S. J., Owens, D. K., Barry, M. J., Caughey, A. B., Davidson, K. W., & US Preventive Services Task Force. (2018). Vitamin D, calcium, or combined supplementation for the primary prevention of fractures in community-dwelling adults: US Preventive Services Task Force recommendation statement. *Jama*, *319*(15), 1592-1599.
148. Gupta, S., Gupta, H., Mandhyan, D., & Srivastava, S. (2013). Bisphophonates related osteonecrosis of the jaw. *National journal of maxillofacial surgery*, *4*(2), 151.
149. Gupta, S., Sunder, N., & Pingali, P. L. (2020). Are women in rural India really consuming a less diverse diet.*Food and Nutrition Bulletin*, *41*(3), 318-331.
150. Gurney, E. P., Nachtigall, M. J., Nachtigall, L. E., & Naftolin, F. (2014). The Women's Health Initiative trial and related studies: 10 years later: a clinician's view. *The Journal of steroid biochemistry and molecular biology*, *142*, 4-11.
151. Ha, J., &Baek, K. H. (2020). Body mass index at the crossroads of osteoporosis and type 2 diabetes. *The Korean Journal of Internal Medicine*, *35*(6), 1333.
152. Haasum, Y., Fastbom, J., Fratiglioni, L., & Johnell, K. (2012). Undertreatment of osteoporosis in persons with dementia? A population-based study. *Osteoporosis International*, *23*(3), 1061-1068.
153. Hamann, C., Kirschner, S., Günther, K. P., & Hofbauer, L. C. (2012). Bone, sweet bone—osteoporotic fractures in diabetes mellitus. *Nature Reviews Endocrinology*, *8*(5), 297-305.
154. Han, Y., You, X., Xing, W., Zhang, Z., & Zou, W. (2018). Paracrine and endocrine actions of bone-the functions of secretory proteins from osteoblasts, osteocytes, and osteoclasts. *Bone research*, *6*(1), 1-11.
155. Handforth, C., D'Oronzo, S., Coleman, R., & Brown, J. (2018). Cancer treatment and bone health. *Calcified tissue international*, *102*(2), 251-264.
156. Hannan MT, Felson DT, Dawson-Hughes B, Tucker KL, Cupples LA, Wilson PW, et al. (2000) Risk factors for longitudinalbone loss in elderly men and women: the Framingham Osteoporosis Study. *J Bone Miner Res.*, 15:710-20.
157. Harinarayan, C. V. (2018). How to treat Vitamin D deficiency in sun-drenched India-guidelines. *J Clin Sci Res*, *7*(3), 131-40.
158. Harinarayan, C. V., Akhila, H., &Shanthisree, E. (2021). Modern india and dietary calcium deficiency-half a century nutrition data-retrospect-introspect and the road ahead. *Frontiers in Endocrinology*, *12*, 583654.

159. Harris S, Dawson-Hughes B. (2006).Weight, body composition, and bone density in postmenopausal women. *Calcified tissueinternational*. 2006; 59(6): 428-432.
160. Hassan N.M. (2015): Chicken eggshell powder as dietary calcium source in biscuits. World Journal of Dairy and Food Sciences, 10: 199-206.
161. Henry, M. J., Pasco, J. A., Korn, S., Gibson, J. E., Kotowicz, M. A., & Nicholson, G. C. (2010). Bone mineral density reference ranges for Australian men: Geelong Osteoporosis Study. *Osteoporosis international*, *21*(6), 909-917.
162. Hernlund, E., Svedbom, A., Ivergård, M., Compston, J., Cooper, C., Stenmark, J., & Kanis, J. A. (2013). Osteoporosis in the European Union: medical management, epidemiology and economic burden. *Archives of osteoporosis*, *8*(1), 1-115.
163. Hill, K. M., Martin, B. R., Wastney, M. E., McCabe, G. P., Moe, S. M., Weaver, C. M., & Peacock, M. (2013). Oral calcium carbonate affects calcium but not phosphorus balance in stage 3-4 chronic kidney disease. *Kidney international*, *83*(5), 959-966.
164. Hochberg Z (ed): (2003) Vitamin D and Rickets. Endocr Dev. Basel, Karger, Vol.6, pp 1-13
165. Holick, M. F. (2004). Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. *The American journal of clinical nutrition*, *80*(6), 1678S-1688S.
166. Hsu, T. L., Tantoh, D. M., Chou, Y. H., Hsu, S. Y., Ho, C. C., Lung, C. C., & Liaw, Y. P. (2020). Association between osteoporosis and menopause in relation to SOX6 rs297325 variant in Taiwanese women. *Menopause (New York, NY)*, *27*(8), 887.
167. Hu, F. B., & Willett, W. C. (2002). Optimal diets for prevention of coronary heart disease. *Jama*, *288*(20), 2569-2578.
168. Huncharek M, Muscat J, Kupelnick B . Colorectal cancer risk and dietary intake of calcium, vitamin D, and dairy products: a meta-analysis of 26,335 cases from 60 observational studies. *Nutr Cancer* 2009 ; 61 : 47 - 69 Reid IR, Bolland MJ . Calcium supplementation and vascular disease. *Climacteric* 2008 ; 11 : 280 - 6
169. Idrees, Z., Zakir, U., Khushdil, A., &Shehzadi, H. (2018). Osteoporosis: Knowledge and practices among females of reproductive age group. *Rawal Med J*, *43*(1), 56-60.
170. International Orthopedics Foundation. Facts and Statistics. 2009.
171. Institute of Medicine (US) Committee to Review Dietary Reference Intakes for Vitamin D and Calcium, 2012.
172. Inzerillo AM, Epstein S. Osteoporosis and diabetes mellitus. *Rev Endocr Metab Disord.* 2004;5:261-268.
173. Isidro ML, Ruano B. Bone disease in diabetes. *Curr Diabetes Rev.* 2010;6 (3):144-155.
174. Islam, R. M., Bell, R. J., Billah, B., Hossain, M. B., & Davis, S. R. (2016). Prevalence and severity of vasomotor symptoms and joint pain in women at midlife in Bangladesh: a population-based survey. *Menopause*, *23*(7), 731-739.
175. Ivanova St, Tsvetkova D, Danchev N (2017) Ethiology of osteoporosis and therapeutic strategies. Sci. Pharmacol., 2, 25-32.
176. Jakobsen, A., Laurberg, P., Vestergaard, P., & Andersen, S. (2013). Clinical risk factors for osteoporosis are common among elderly people in Nuuk, Greenland. *International journal of circumpolar health*, *72*(1), 19596.
177. James, N (2016). Osteoporosis in Women.The Effects of Menopause on Bone Strength, Calcium & Osteoporosis and the Influence of Estrogen on Osteoporosis.
178. Jang SY, Kwon T.K, Jeong Y.J, Seo J.H, Park Y.M. 2007. The effect of water soluble calcium supplements on calcium metabolism and bone metabolism of growing rats. Korean J Food SciNutr 12: 217-221.
179. Janiszewska, M., Kulik, T., Dziedzic, M. A., & Żołnierczuk-Kieliszek, D. (2015). Chosen risk factors for osteoporosis and the level of knowledge about the disease in peri-and postmenopausal women.*Menopause Review/Przegląd Menopauzalny*, *14*(1), 27-34.
180. Jaramillo, J. D., Wilson, C., Stinson, D. J., Lynch, D. A., Bowler, R. P., Lutz, S., ... & Regan, E. A. (2015). Reduced bone density and vertebral fractures in smokers. Men and COPD patients at increased risk. *Annals of the American Thoracic Society*, 12(5), 648-656.
181. Jarjou, L. M., Laskey, M. A., Sawo, Y., Goldberg, G. R., Cole, T. J., & Prentice, A. (2010). Effect of calcium supplementation in pregnancy on maternal bone outcomes in women with a low calcium intake. *The American journal of clinical nutrition*, *92*(2), 450-457.
182. Ji, M. X., & Yu, Q. (2015). Primary osteoporosis in postmenopausal women. *Chronic diseases and translational medicine*, *1*(01), 9-13.

183. Jilka, R. L., & O'Brien, C. A. (2016). The role of osteocytes in age-related bone loss. Current osteoporosis reports, 14(1), 16-25.
184. Jilka RL. Molecular and cellular mechanisms of the anabolic effect of intermittent PTH. *Bone.* 2007;40:1434-1446.
185. Johnson.,D. B., Noel Bairey Merz, C., Braunstein, G. D., Berga, S. L., Bittner, V., Keta Hodgson, T., & Kelsey, S. F. (2004). Determination of menopausal status in women: the NHLBI-sponsored Women's Ischemia Syndrome Evaluation (WISE) Study. *Journal of women's health*, *13*(8), 872-887.
186. Jules, J., Zhang, P., Ashley, J. W., Wei, S., Shi, Z., Liu, J.,& Feng, X. (2012). Molecular basis of requirement of receptor activator of nuclear factor κB signaling for interleukin 1-mediated osteoclastogenesis. *Journal of Biological Chemistry*, *287*(19), 15728-15738.
187. Kadam, N., Chiplonkar, S., Khadilkar, A., & Khadilkar, V. (2019). Low knowledge of osteoporosis and its risk factors in urban Indian adults from Pune city, India. *Public health nutrition*, *22*(7), 1292-1299.
188. Kane, R., Stevenson, L., Godson, C., Stitt, A. W., & O'brien, C. (2005). Gremlin gene expression in bovine retinal pericytes exposed to elevated glucose. *British Journal of Ophthalmology*, *89*(12), 1638-1642.
189. Kane-Potaka, J., Anitha, S., Tsusaka, T. W., Botha, R., Budumuru, M., Upadhyay, S., & Nedumaran, S. (2021). Assessing millets and sorghum consumption behavior in urban India: A large-scale survey. *Frontiers in sustainable food systems*, *5*.
190. Kanis JA on behalf of the World Health Organization Scientific Group. *Technical Report.* World Health OrganizationCollaborating Centre for Metabolic Bone Diseases, University of Sheffield; UK: 2007. Assessment of osteoporosisat the primary health-care level.
191. Kanis J.A, McCloskey E.V, Johansson H, Cooper C, R izzoli R, Reginster J.Y; Scientific Advisory Board of the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis and the Committee of Scientifi Advisors of the International Osteoporosis Foundation. European guidance for *Calcium and bone health Ströhle, Hadji and Hahn* the diagnosis and management of osteoporosis in postmenopausal women. *Osteoporos Int* 2013; 24 : 23 - 57.
192. Kanis JA, Oden A, Johnell O, Johansson H, De Laet C, Brown J, et al. The use of clinical risk factors enhances the performance of BMD in the prediction of hip and osteoporotic fractures in men and women.*Osteoporos Int.* 2007;18:1033-46.
193. Kanis JA, Stevenson M, McCloskey EV, Davis S, Llyd-Jones M. Glucocorticoid-induced osteoporosis: a systematicreview and cost-utility analysis. *Health Technol Assess.* 2007;11:1-231.
194. Kanis, J. A., Johansson, H., Johnell, O., Oden, A., De Laet, C., Eisman, J. A., Pols, H., &Tenenhouse, A. (2005). Alcohol intake as a risk factor for fracture. OsteoporosisInternational, 16(7), 737-742.
195. Kanis, J. A., Johnell, O., De Laet, C. E. D. H., Johansson, H., Odén, A., Delmas, P. & Tenenhouse, A. (2004). A meta-analysis of previous fracture and subsequent fracture risk. *Bone*, *35*(2), 375-382.
196. Kanis, J. A., Johnell, O., De Laet, C., Johansson, H., Oden, A., Delmas, P., Eisman, J., Fujiwara, S., Garnero, P., Kroger, H., McCloskey, E. V., Mellstrom, D., Melton, L. J., Pols, H., Reeve, J., Silman, A., &Tenenhouse, A.(2004). A meta-analysis of previous fracture and subsequent fracture. Bone, 35(2), 375-382.
197. Kanis, J. A., McCloskey, E. V., Johansson, H., Strom, O., Borgstrom, F., & Odén, A. (2008). Case finding for the management of osteoporosis with FRAX®assessment and intervention thresholds for the UK. *Osteoporosis international*, *19*(10), 1395-1408.
198. Kanis, J. A., Odén, A., McCloskey, E. V., et al. (2012). A systematic review of hip fracture incidence and probability of fracture worldwide. Osteoporosis International. Web of Science, 23(9), 2239-2256.
199. Karsenty G., Kronenberg H.M., Settembre C. 2009. Genetic control of bone formation. *Annu. Rev. Cell Dev. Biol.* 25:629-648.
200. Kaushal, N., Vohora, D., Jalali, R. K., & Jha, S. (2018). Prevalence of osteoporosis and osteopenia in an apparently healthy Indian population-a cross-sectional retrospective study. *Osteoporosis and Sarcopenia*, *4*(2), 53-60.
201. Kelley, G. A., Kelley, K. S., & Tran, Z. V. (2002). Exercise and lumbar spine bone mineral density in postmenopausal women: a meta-analysis of individual patient data. *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, *57*(9), M599-M604.
202. Kepley, A. L., Nishiyama, K. K., Zhou, B., Wang, J., Zhang, C., McMahon, D. J& Nickolas, T. L. (2017). Differences in bone quality and strength between Asian and Caucasian young men. *Osteoporosis International*, *28*(2), 549-558.

203. Keramat, A., Patwardhan, B., Larijani, B., Chopra, A., Mithal, A., Chakravarty, D., & Khosravi, A. (2008). The assessment of osteoporosis risk factors in Iranian women compared with Indian women. *BMC musculoskeletal disorders*, *9*(1), 1-10.
204. Khadilkar, A. V., & Mandlik, R. M. (2015). Epidemiology and treatment of osteoporosis in women: an Indian perspective. *International journal of women's health*, *7*, 841.
205. Khajuria, D. K., Razdan, R., & Mahapatra, D. R. (2011). Medicamentos para o tratamento da osteoporose: revisão. *Revista brasileira de reumatologia*, *51*, 372-382.
206. Khan, K., McKay, H. A., Haapasalo, H., Bennell, K. L., Forwood, M. R., Kannus, P., & Wark, J. D. (2000). Does childhood and adolescence provide a unique opportunity for exercise to strengthen the skeleton. *Journal of Science and Medicine in Sport*, *3*(2), 150-164.
207. Khani *et al.,* 2021 Khani, S., Azizi, M., Elyasi, F., Kamali, M., & Moosazadeh, M. (2021). The prevalence of sexual dysfunction in the different menopausal stages: A systematic review and meta-analysis. *International Journal of Sexual Health*, *33*(3), 439-472.
208. Khanna, P., &Bhargava, S. (2011). Roentgen assessment of bone density in North Indian population. The Indian Journal of Medical Research, 59(10), 1599-1609.
209. Kim HJ, Kim SH, Yun JM. Fisetin inhibits hyperglycemia-induced proinflammatory cytokine production by epigenetic mechanisms. *Evid Based Complement Alternat Med.* 2012;2012:639469.
210. Kim MS, Yang YM, Son A, et al. RANKL-mediated reactive oxygen species pathway that induces long lasting Ca2+ oscillations essential for osteoclastogenesis. *J Biol Chem.* 2010;285(10):6913-6921.
211. Kim, J., Lee, J., Shin, J. Y., & Park, B. J. (2015). Socioeconomic disparities in osteoporosis prevalence: different results in the overall Korean adult population and single-person households. *Journal of preventive medicine and public health*, *48*(2), 84.
212. King'Ori, A. M. (2011). A review of the uses of poultry eggshells and shell membranes. *International Journal of Poultry Science*, *10*(11), 908-912
213. Klein-Nulend, J., Van Oers, R. F. M., Bakker, A. D., &Bacabac, R. G. (2014). Nitric oxide signaling in mechanical adaptation of bone. *Osteoporosis international*, *25*(5), 1427-1437.
214. Klibanski, A., Adams-Campbell, L., Bassford, T., Blair, S. N., Boden, S. D., Dickersin, K.,& Russell, W. E. (2001). Osteoporosis prevention, diagnosis, and therapy. *Journal of the American Medical Association*, *285*(6), 785-795.
215. Koh, L. K. H., Ben Sedrine, W., Torralba, T. P., Kung, A., Fujiwara, S., Chan, S. P., & Reginster, J.Y. (2001). A simple tool to identify Asian women at increased risk of osteoporosis. *Osteoporosis international*, *12*(8), 699-705.
216. Kopiczko, A. (2014). Assessment of intake of calcium and vitamin D and sun exposure in the context of osteoporosis risk in a study conducted on perimenopausal women. *Menopause Review/Przegląd Menopauzalny*, *13*(2), 79-83.
217. Kothari,C.R .(2004). Research Methodology Methods & Techniques.Second edition. New Age International (P) Limited, Publishers.
218. Kothari,C.R .Garg,G.(2019). Research Methodology Methods & Techniques.Fourth edition. New Age International (P) Limited, Publishers.
219. Krishna U., Mehta R.U. (2000). Osteoporosis-Incidence and implications. *J. Obstet. Gynecol. India* ; 50:150-156
220. Kumar, A., Mittal, S., Orito, S., Ishitani, K., & Ohta, H. (2010). Impact of dietary intake, education, and physical activity on bone mineral density among North Indian women. *Journal of bone and mineral metabolism*, *28*(2), 192-201.
221. Kweon, S., Kim, Y., Jang, M. J., Kim, Y., Kim, K., Choi, S., & Oh, K. (2014). Data resource profile: the Korea national health and nutrition examination survey (KNHANES). *International journal of epidemiology*, *43*(1), 69-77.
222. Laird, E., Ward, M., McSorley, E., Strain, J. J., & Wallace, J. (2010). Vitamin D and bone health; Potential mechanisms. *Nutrients*, *2*(7), 693-724.
223. Lakhotia SM, Dongre P. Treatment algorithm for Indian patients of osteoporosis. *Ind Med Gaz.* 2012; 47(2):67-77.
224. Langdahl, B. L., Teglbjærg, C. S., Ho, P. R., Chapurlat, R., Czerwinski, E., Kendler, D. L., & Orwoll, E. (2015). A 24-month study evaluating the efficacy and safety of denosumab for the treatment of men with low bone mineral density: results from the ADAMO trial. *The Journal of Clinical Endocrinology & Metabolism*, *100*(4), 1335-1342.
225. Larsen, S., Bendtzen, K., & Nielsen, O. H. (2010). Extraintestinal manifestations of inflammatory bowel disease: epidemiology, diagnosis, and management. *Annals of medicine*, *42*(2), 97-114.

226. Larsson, S. C., Orsini, N., & Wolk, A. (2013). Dietary calcium intake and risk of stroke: a dose-response meta-analysis. *The American of Clinical Nutrition*, *97*(5), 951-957.
227. Lau, Y. K., Lee, C. E., Prior, H. J., Lix, L. M., Metge, C. J., & Leslie, W. D. (2009). Fracture risk in androgen deprivation therapy: a Canadian population based analysis. *Canadian Journal of Urology*, *16*(6), 4908.
228. Lawless, H. T., & Heymann, H. (2010). *Sensory evaluation of food: principles and practices* (Vol. 2). New York: Springer.
229. LeBlanc, E. S., Rosales, A. G., Black, D. M., Genant, H. K., Dell, R. M., Friess, D. M., & Orwoll, E. S. (2017). Evaluating atypical features of femur fractures: how change in radiological criteria influenced incidence and demography of atypical femur fractures in a community setting. *Journal of Bone and Mineral Research*, *32*(11), 2304-2314.
230. Lee, C., Almagor, O., Dunlop, D. D., Chadha, A. B., Manzi, S., Spies, S., & Ramsey-Goldman, R. (2007). Association between African American race/ethnicity and low bone mineral density in women with systemic lupus erythematosus. *Arthritis Care & Research*, *57*(4), 585-592.
231. Lee, D. S., & Robertson, G. L. (2021). Interactive influence of decision criteria, packaging film, storage temperature and humidity on shelf life of packaged dried vegetables. *Food Packaging and Shelf Life*, *28*, 100674.
232. Lee, H. J., Kim, C. O., & Lee, D. C. (2021). Association between Daily Sunlight Exposure and Fractures in Older Korean Adults with Osteoporosis: A Nationwide Population-Based Cross-Sectional Study. *Yonsei Medical Journal*, *62*(7), 593.
233. Lee, J. H., Kim, J. H., Hong, A. R., Kim, S. W., & Shin, C. S. (2020). Optimal body mass index for minimizing the risk for osteoporosis and type 2 diabetes. *The Korean journal of internal medicine*, *35*(6), 1432.
234. Lee, M. S., Pittler, M. H., & Ernst, E. (2008). Tai chi for osteoarthritis: a systematic review. *Clinical rheumatology*, *27*(2), 211-218.
235. Lee, S. E., Talegawkar, S. A., Merialdi, M., & Caulfield, L. E. (2013). Dietary intakes of women during pregnancy in low-and middle-income countries. *Public health nutrition*, *16*(8), 1340-1353.
236. Lems, W. F., & Dijkmans, B. A. C. (1998). Should we look for osteoporosis in patients with rheumatoid arthritis. *Annals of the rheumatic diseases*, *57*(6), 325-327.
237. Levine, J. S., & Burakoff, R. (2011). Extraintestinal manifestations of inflammatory bowel disease. *Gastroenterology & hepatology*, *7*(4), 235.
238. Lewis RD, Modlesky CM. (2008).Nutrition, physical activity, and bone health in women. *International Journal of sport nutrition*., 8: 250-284.
239. Lewis, J. R., Radavelli-Bagatini, S., Rejnmark, L., Chen, J. S., Simpson, J. M., Lappe, J. M., & Prince, R. L. (2015). The effects of calcium supplementation on verified coronary heart disease hospitalization and death in postmenopausal women: a collaborative meta-analysis of randomized controlled trials. *Journal of Bone and Mineral Research*, *30*(1), 165-175.
240. Li WC et al. Effects of exercise programmes on quality of life in osteoporotic and osteopenic postmenopausal women: a systematic review and meta-analysis. *Clinicalrehabilitation*. 2009; 23(10): 888-896.
241. Licata A, Geusens P, Flowers K, Seeman E. Risk of new vertebral fracture in the year following a fracture. *JAMA*. 2001;285(3):320-323.
242. Liew PE, Shanmugarajah B, Chew IML, Choong TSY, Tan K W (2015). Ultrasound Assisted Extraction of Nano Calcium from Waste Eggshell: A Preliminary Study on Crystal Violet Dye Removal.Chemical Engineering Transactions, 45: 1711-1716
243. Lima, G. A. C., Lima, P. D. A., Barros, M. D. G. C. R. M. D., Vardiero, L. P., Melo, E. F. D., Paranhos-Neto, F. D. P.,& Farias, M. L. F. D. (2016). Calcium intake: good for the bones but bad for the heart. An analysis of clinical studies. *Archives of endocrinology and metabolism*, *60*, 252-263.
244. Lin, C. L., Wang, J. Y., Ko, J. Y., Huang, Y. T., Kuo, Y. H., & Wang, F. S. (2010). Dickkopf-1 promotes hyperglycemia-induced accumulation of mesangial matrix and renal dysfunction. *Journal of the American Society of Nephrology*, *21*(1), 124-135.
245. Longvah, T., Anantan, I., Bhaskarachary, K., Venkaiah, K., & Longvah, T. (2017). *Indian food composition tables* (Pp. 2-58). Hyderabad: National Institute of Nutrition, Indian Council of Medical Research.
246. Looker, A. C., & Frenk, S. M. (2015). Percentage of adults aged 65 and over with osteoporosis or low bone mass at the femur neck or lumbar spine: United States, 2005-2010. *Division of Health and Nutrition Examination Surveys, CDC*.

247. Lorieau, L., Le Roux, L., Gaucheron, F., Ligneul, A., Hazart, E., Dupont, D., & Floury, J. (2018). Bioaccessibility of four calcium sources in different whey-based dairy matrices assessed by in vitro digestion. *Food chemistry*, *245*, 454-462.
248. Lydick, E., Cook, K., Turpin, J., Melton, M., Stine, R., & Byrnes, C. (1998).Development and validation of a simple questionnaire to facilitate identification of women likely to have low bone density. *Am J Manag Care*, *4*(1), 37-48.
249. Macdonald HM, New SA, Golden MH et al. Nutritional associations with bone loss during the menopausal transition: evidence of a beneficial effect of calcium, alcohol, and fruit and vegetable nutrients and of a detrimental effect of fatty acids. Am J Clin Nutr 2004; 79: 155-65
250. Macdonald HM, Reid IR, Gamble GD, Fraser WD, Tang JC, Wood AD. 25-Hydroxyvitamin D Threshold for the Effects of Vitamin D Supplements on Bone Density: Secondary Analysis of a Randomized Controlled Trial. *J Bone Miner Res*. 2018;33(8):1464-1469.
251. Macdonald HM, Wood AD, Aucott LS, et al. (2013). Hip bone loss is attenuated with 1000 IU but not 400 IU daily vitamin D3: A 1-year double-blind RCT in postmenopausal women. *J Bone Miner Res*;28(10):2202-2213.
252. Mahan LK, Escott-Stump S, Raymond JL. *Krause's Food and the Nutrition Care Process.* 13th ed. St Louis: Elsevier;2012.
253. Makai, F., &Chudacek, J. (2011). The treatment of osteoporosis with BiominH. Arch. Gerontol. Geriatr, 2, 487-490.
254. Malhotra, R., Meena, S., & Digge, V. K. (2013). Tensile type of stress fracture neck of femur: role of teriparatide in the process of healing in a high risk patient for impaired healing of fracture. Clinical Cases in Mineral and Bone Metabolism, 10(3), 210.
255. Maresz, K. (2015). Proper calcium use: vitamin K2 as a promoter of bone and cardiovascular health. *Integrative Medicine: A Clinician's Journal*, *14*(1), 34.
256. Marini, S., Barone, G., Masini, A., Dallolio, L., Bragonzoni, L., Longobucco, Y., & Maffei, F. (2020). The effect of physical activity on bone biomarkers in people with osteoporosis: a systematic review. Frontiers in endocrinology, 11, 585689.
257. Marjoribanks J, Farquhar C, Roberts H, Lethaby A (2012) Long term hormone therapy for perimenopausal and postmenopausal women. ochrane Database of Systematic Reviews (7): CD004143.
258. Marpalle, P., Sonawane, S. K., & Arya, S. S. (2014). Effect of flaxseed flour addition on physicochemical and sensory properties of functional bread. *LWT-Food Science and Technology*, *58*(2), 614-619.
259. Marshall D, Johnell O, Wedel H. Meta-analysis of how well measures of bone mineral density predict occurrence of osteoporotic fractures. BMJ 1996; 312: 1254-9.
260. Marshall, M. (1996). Sampling for qualitative research. Family Practice: An International Journal, 13, 522-525.
261. Marwaha, R. K., Tandon, N., Garg, M. K., Kanwar, R., Narang, A., Sastry, A. & Mithal, A. (2011). Bone health in healthy Indian population aged 50 years and above. Osteoporosis international, 22(11), 2829-2836.
262. Marwaha, R. K., Tandon, N., Gupta, Y., Bhadra, K., Narang, A., Mani, K., & Kukreja, S. (2012). The prevalence of and risk factors for radiographic vertebral fractures in older Indian women and men: Delhi Vertebral Osteoporosis Study (DeVOS). *Archives of osteoporosis*, *7*(1), 201-207.
263. Marwaha, R. K., Tandon, N., Shivaprasad, C., Kanwar, R., Mani, K., Aggarwal, R., & Tripathi, R. P. (2009). Peak bone mineral density of physically active healthy Indian men with adequate nutrition and no known current constraints to bone mineralization. *Journal of Clinical Densitometry*, *12*(3), 314-321.
264. McClung, M., Harris, S. T., Miller, P. D., Bauer, D. C., Davison, K. S., Dian, L.& Lewiecki, E. M. (2013). Bisphosphonate therapy for osteoporosis: benefits, risks, and drug holiday. The American journal of medicine, 126(1), 13-20.
265. McEwen B.S., (2003). Interacting mediators of allostasis and allostatic load: towards an understanding of resilience in aging. Metabolism;52:10-6.
266. Meeta, C. V., Marwah, R., Sahay, R., Kalra, S., & Babhulkar, S. (2013). Clinical practice guidelines on postmenopausal osteoporosis: An executive summary and recommendations. Journal of mid-life health, 4(2), 107.
267. Meeta. (2013). *Postmenopausal Osteoporosis: Basic and Clinical Concepts*. Jaypee Brothers Pvt. Limited.
268. Melton III, L. J., Chrischilles, E. A., Cooper, C., Lane, A. W., & Riggs, B. L. (1992). Perspective how many women have osteoporosis?. Journal of bone and mineral research, 7(9), 1005-1010.

269. MELTON III, L. J., Kan, S. H., Frye, M. A., Wahner, H. W., O'fallon, W. M., & Riggs, B. L. (1989). Epidemiology of vertebral fractures in women. American journal of epidemiology, 129(5), 1000-1011.
270. Menegazzo L, Albiero M, Avogaro A, Fadini GP. Endothelial progenitor cells in diabetes mellitus. *Biofactors.* 2012;38(3):194-202.
271. Metz, J. A., Anderson, J. J., & Gallagher Jr, P. N. (1993). Intakes of calcium, phosphorus, and protein, and physical-activity level are related to radial bone mass in young adult women. *The American journal of clinical nutrition*, *58*(4), 537-542.
272. Milbradt B.G., Muller A.L.H., da Silva J.S., Lunardi J.R., Milani L.I.G., de Moraes Flores E.M., Callegaro M.D.G.K., Emanuelli T. (2015): Eggshell as calcium source for humans: Mineral composition and microbiological analysis. Ciencia Rural, 45: 560-567.
273. Mithal, A., &Kaur, P. (2012). Osteoporosis in Asia: A call to action Current Osteoporosis Rep. Current Osteoporosis Rep, 10, 245-247.
274. Mithal, A., Bansal, B., Kyer, C. S., & Ebeling, P. (2014). The Asia-pacific regional audit-epidemiology, costs, and burden of osteoporosis in India 2013: a report of international osteoporosis foundation. Indian journal of endocrinology and metabolism, 18(4), 449.
275. Minisola, S., Cipriani, C., Occhiuto, M., & Pepe, J. (2017). New anabolic therapies for osteoporosis. Internal and Emergency Medicine, 12(7), 915-921.
276. Moayeri A, Mohamadpour M, Mousavi SF, Shirzadpour E, Mohamadpour S, Amraei M. Fracture risk in patients with type 2 diabetes mellitus and possible risk factors: a systematic review and meta-analysis. *Ther Clin Risk Manag.* 2017;13:455-468.
277. Modagan P, Silambanan S, Menon PG, Arunalatha P. Comparison of bone mineral density with biochemical parameters and prevalence of osteopenia and osteoporosis in South Indian population. *Biomed Pharmacol J.* 2018;11(4):2209-2214.
278. Morabito, N., Crisafulli, A., Vergara, C., Gaudio, A., Lasco, A., Frisina, N.,& Squadrito, F. (2002). Effects of genistein and hormone-replacement therapy on bone loss in early postmenopausal women: a randomized double-blind placebo-controlled study. Journal of Bone and Mineral Research, 17(10), 1904-1912.
279. Mora Raimundo, P., Manzano García, M., & Vallet Regí, M. (2017). Nanoparticles for the tratment of osteoporosis.
280. Mosavat, M., Ooi, F. K., & Mohamed, M. (2014). Effects of honey supplementation combined with different jumping exercise intensities on bone mass, serum bone metabolism markers and gonadotropins in female rats. BMC complementary and alternative medicine, 14(1), 1-8.
281. Motaghi, P., Payami, S. P., & Mowla, H. K. (2011). Evaluation of osteoporosis risk assessment instrument (ORAI) in Iranian postmenopausal women.
282. Mott, A., Bradley, T., Wright, K., Cockayne, E. S., Shearer, M. J., Adamson, J., & Torgerson, D. J. (2019). Effect of vitamin K on bone mineral density and fractures in adults: an updated systematic review and meta-analysis of randomised controlled trials. *Osteoporosis International*, *30*(8), 1543-1559.
283. Moyer VA. Vitamin D and calcium supplementation to prevent fractures in adults: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med.* 2013;158:691-6.
284. Mundy GR. Osteoporosis and inflammation. *Nut Rev.* 2007;65(12 Pt 2):S147-S151.
285. Munger RG, Cerhan JR, Chiu BC. (2009).Prospective study of dietary protein intake and risk of hip fracture in postmenopausal women. *The American journal of clinical nutrition*; 69(1): 147-152.
286. Murakami F.S., Rodrigues P.O., Campos C.M.T.D., Silva M.A.S. (2007): Physicochemical study of CaCO3 from eggshells. Food Science and Technology, 27: 658-662.
287. Murakami, F. S., Rodrigues, P. O., Campos, C. M. T. D., & Silva, M. A. S. (2007). Physicochemical study of CaCO3 from egg shells. *Food Science and Technology*, *27*, 658-662
288. Nakamura K, Saito T, Kobayashi R, Oshiki R, Oyama M, Nishiwaki T, Nashimoto M, Tsuchiya Y. C-reactive protein predicts incidentfracture in community-dwelling elderly Japanese women: the Muramatsu study. *Osteoporos Int.* 2011;22:2145-50.
289. Nakano T, Ikawa NF, Zienek C (2008). Chemical composition of chicken eggshells and shell membrane.Poultry Science, 8213: 510, 2008.
290. Naot, D., Grey, A., Reid, I.R. & Cornish, J. (2005). Lactoferrin--a novel bone growth factor. *Clin Med Res*, Vol. 3, No. 2, (May 2005), Pp. 93-101
291. National Osteoporosis Foundation. *C linician ' s Guide to Prevention and Treatment of Osteoporosis.* Washington, DC: NationalOsteoporosis Foundation , 2014 .

292. Nellans KW, Kowalski E, Chung KC. The epidemiology of distal radius fractures. *Hand Clinics*. 2012;28:113-125.
293. Nelson HD, Haney EM, Chou R, Dana T, Fu R, Bougatsos C. *Evidence Synthesis No 77.* Rockville, Maryland: Agencyfor Healthcare Research and Quality; Jul, 2010. Screening for osteoporosis: systematic review to update the 2002. U.SPreventive Services Task Force Recommendation.
294. Neumann T, Lodes S, Kastner B, et al. Trabecular bone score in type 1 diabetes-a cross-sectional study. *Osteoporos Int.* 2016;27(1):127-133.
295. Neunzehn J, Szuwart T, Wiesmann H P (2015). Eggshells as natural calcium carbonate source in combination with hyaluronan as beneficial additives for bone graft materials, an in vitro study. Head and Face Medicine, 11(1): 1-10.
296. Nichols CD. (2007) 5-HT2 receptors in Drosophila are expressed in the brain and modulate aspects of circadian behaviors. *DevNeurobiol* 67:752-763
297. NIH Consensus Development Panel on Osteoporosis Prevention, Diagnosis, and Therapy. Osteoporosis prevention,diagnosis, and therapy. *JAMA.* 2001;285:785-95.
298. Nijenhuis, T., Renkema, K.Y., Hoenderop, J.G. & Bindels, R.J. (2006). Acid-base status determines the renal expression of Ca2+ and Mg2+ transport proteins. *J Am SocNephrol*, Vol. 17, No. 3, (Mar 2006), Pp. 617-626
299. Nordstro, M.A., Olsson, T., & Nordström, P. (2006). Sustained benefits from previous physical activity on bone mineral density in males. *The Journal of Clinical Endocrinology & Metabolism*, *91*(7), 2600-2604.
300. North American Menopause Society. (2010). Estrogen and progestogen use in postmenopausal women: 2010 position statement of The North American Menopause Society. Menopause (New York, NY), 17(2), 242-255.
301. Nuti, R., Brandi, M. L., Checchia, G., Di Munno, O., Dominguez, L., Falaschi, P., Michieli, R. (2019). Guidelines for the management of osteoporosis and fragility fractures. Internal and emergency medicine, 14(1), 85-102.
302. Nutrient Requirements and Recommended Dietary Allowance for Indians. A Report of the Expert Group of the Indian Council of Medical Research, New Delhi.
303. Olgun, O., Yildiz, A.Ö. and Cufadar, Y. 2015. The effects of eggshell and oyster shell supplemental as calcium sources on performance, eggshell quality and mineral excretion in laying hens. Indian J. Anim. Res. 49, 205-209.
304. Omotayo, M. O., Martin, S. L., Stoltzfus, R. J., Ortolano, S. E., Mwanga, E., & Dickin, K. L. (2018). With adaptation, the WHO guidelines on calcium supplementation for prevention of pre-eclampsia are adopted by pregnant women. Maternal & child nutrition, 14(2), e12521.
305. Omsland, T. K., Ahmed, L. A., Grønskag, A., Schei, B., Emaus, N., Langhammer, A., & Meyer, H. E. (2011). More forearm fractures among urban than rural women: the NOREPOS study based on the Tromsø study and the HUNT study. *Journal of bone and mineral research*, *26*(4), 850-856..
306. Onakpoya, I. J., Perry, R., Zhang, J., & Ernst, E. (2011). Efficacy of calcium supplementation for management of overweight and obesity: systematic review of randomized clinical trials. Nutrition reviews, 69(6), 335-343.
307. Oreffo, R.O., Mundy, G.R., Seyedin, S.M & Bonewald, L.F. (2000). Activation of the bonederived latent TGF beta complex by isolated osteoclasts. *Biochem Biophys Res Commun*, Vol. 158, No. 3, (Feb 15 2000), Pp. 817-823
308. Paccou J, Edwards MH, Ward K, et al. Relationships between bone geometry, volumetric bone mineral density and bone microarchitecture of the distal radius and tibia with alcohol consumption. *Bone*. 2015;78:122-129.
309. Pal, K.G.(2017)Comprehencive test book of medical physiology. Jaypee Brothers Medical Publishers (P) Ltd.
310. Panheleux, M., Kalin, O., Gautron, J., & Nys, Y. (1999). Features of eggshell formation in guinea fowl: kinetics of shell deposition, uterine protein secretion and uterine histology. *British poultry science*, *40*(5), 632-643.
311. Paolucci, T., Saraceni, V. M., & Piccinini, G. (2016). Management of chronic pain in osteoporosis: challenges and solutions. *Journal of pain research*, *9*, 177.
312. Papaioannou A, Morin S, Cheung AM, Atkinson S, Brown JP, Feldman S, et al. 2010 clinical practice guidelines for thediagnosis and management of osteoporosis in Canada: summary. *CMAJ.* 2010;182:1864-73.
313. Park, Y., Moon, H. J., Paik, D. J., & Kim, D. Y. (2013). Effect of dietary legumes on bone-specific gene expression in ovariectomized rats. *Nutrition Research and Practice*, *7*(3), 185-191.

314. Parschau, L., Barz, M., Richert, J., Knoll, N., Lippke, S., & Schwarzer, R. (2014). Physical activity among adults with obesity: testing the Health Action Process Approach. *Rehabilitation psychology*, *59*(1), 42.
315. Paruk F, Tsabasvi M, Kalla AA. Osteoporosis in Africa-where are we now. Clin Rheumatol. 2020;40:3419-28.
316. Paschalis, E. P., Gamsjaeger, S., Hassler, N., Fahrleitner-Pammer, A., Dobnig, H., Stepan, J. J., & Klaushofer, K. (2017). Vitamin D and calcium supplementation for three years in postmenopausal osteoporosis significantly alters bone mineral and organic matrix quality. Bone, 95, 41-46.
317. Pearson, O. M., & Lieberman, D. E. (2004). The aging of Wolff's "law": ontogeny and responses to mechanical loading in cortical bone. American journal of physical anthropology, 125(S39), 63-99.
318. Penido, M. G. M., & Alon, U. S. (2012). Phosphate homeostasis and its role in bone health. *Pediatric nephrology*, *27*(11), 2039-2048.
319. Phelan, E. A., Mahoney, J. E., Voit, J. C., & Stevens, J. A. (2015). Assessment and management of fall risk in primary care settings. Medical Clinics, 99(2), 281-293.
320. Phil G, Zhihong M. High Value Products from Hatchery Waste RIRDC, Publication. 2009, 09/061
321. Pines M, Knopov V, Bar A. (1995). Involvement of osteopontin in eggshell formation in the laying chicken. Matrix Biology,14(9):765-71.
322. Pinheiro, M. B., Oliveira, J., Bauman, A., Fairhall, N., Kwok, W., & Sherrington, C. (2020). Evidence on physical activity and osteoporosis prevention for people aged 65+ years: a systematic review to inform the WHO guidelines on physical activity and sedentary behaviour. *International Journal of Behavioral Nutrition and Physical Activity*, *17*(1), 1-53.
323. Platon N., Arus V.A., Georgescu A.M., Nistor I.D., Barsan N. (2020): White bread fortified with calcium from eggshell powder. Revista de Chimie, 71: 299-306.
324. Pollock, M. L., Mengelkoch, L. J., Graves, J. E., Lowenthal, D. T., Limacher, M. C., Foster, C., & Wilmore, J. H. (1997). Twenty-year follow-up of aerobic power and body composition of older track athletes. Journal of applied physiology, 82(5), 1508-1516.
325. Poovaiah BW (1986). Role of calcium in prolonging storage life of fruits and vegetables. Food Technology, 40:86-89.
326. Pouresmaeili, F., Kamalidehghan, B., Kamarehei, M., & Goh, Y. M. (2018). A comprehensive overview on osteoporosis and its risk factors. *Therapeutics and clinical risk management*, *14*, 2029.
327. Pradipa, C., Panneerselvam, S., Bharathy, R. D., Dheebakaran, G., Geethalakshmi, V., Ragunath, K. P., & Kowshika, N. (2018). Status of bengal gram over Tamil Nadu. *Agricultural Science Digest-A Research Journal*, *38*(3), 193-196.
328. Prathap, Siva & Akhter Ali, Mohd & Kamraju, M. & Manisha, P.. (2019). Reviving rural economy: A study on Telangana, India. Asian Journal of Multidimensional Research (AJMR).
329. Pravina, P., Sayaji, D., & Avinash, M. (2013). Calcium and its role in human body. *International Journal of Research in Pharmaceutical and Biomedical Sciences*, *4*(2), 659-668.
330. Prentice, A., Dibba, B., Sawo, Y., & Cole, T. J. (2012). The effect of prepubertal calcium carbonate supplementation on the age of peak height velocity in Gambian adolescents. *The American journal of clinical nutrition*, *96*(5), 1042-1050.
331. Prince, R., Devine, A., Dick, I., Criddle, A., Kerr, D., Kent, N., Randell, A. (2015). The effects of calcium supplementation (milk powder or tablets) and exercise on bone density in postmenopausal women. Journal of Bone and Mineral Research: The Official Journal of the American Society for Bone and Mineral Research, 10(7), 1068-1075.
332. Province MA et al. The effects of exercise on falls in elderly patients: a preplanned meta-analysis of the FICSIT trials. *Jama*. 2005; 273(17): 1341-1347.
333. Provinciali, N., Suen, C., Dunn, B. K., & DeCensi, A. (2016). Raloxifene hydrochloride for breast cancer risk reduction in postmenopausal women. *Expert Review of Clinical Pharmacology*, *9*(10), 1263-1272.
334. Pu, F., Chen, N., & Xue, S. (2016). Calcium intake, calcium homeostasis and health. Food Science and Human Wellness, 5(1), 8-16.
335. Puth MT, Klaschik M, Schmid M, Weckbecker K, Munster E. Prevalence and comorbidity of osteoporosis- a cross-sectionalanalysis on 10,660 adults aged 50 years and older in Germany. *BMC Musculoskelet Disord.* 2018;19:144.
336. Radford LT, Bolland MJ, Gamble GD et al. Subgroup analysis for the risk of cardiovascular disease with calcium supplements. BoneKEy Rep 2013; 2: 293, 1-6..
337. Rajendran, S., Afari-Sefa, V., Shee, A., Bocher, T., Bekunda, M., & Lukumay, P. J. (2017). Does crop diversity contribute to dietary diversity Evidence from integration of vegetables into maize-based farming systems. *Agriculture & Food Security*, *6*(1), 1-13.

338. Ralston, S. H., & Uitterlinden, A. G. (2010). Genetics of osteoporosis. *Endocrine reviews*, *31*(5), 629-662.
339. Raska I, Jr, Broulik P. The impact of diabetes mellitus on skeletal health: an established phenomenon with inestablished causes. *Prague Med Rep.* 2005;106(2):137-148.
340. Ray, S., Barman, A. K., Roy, P. K., & Singh, B. K. (2017). Chicken eggshell powder as dietary calcium source in chocolate cakes. *The Pharma Innovation*, *6*(9, Part A), 1.
341. Reid D.M, Devogelaer J.P, Saag K, Roux C, Lau CS, Reginster J.Y, et al. (2009).Zoledronic acid and risedronate in the preventionand treatment of glucocorticoid-induced osteoporosis (Horizon): a multicentre, double-blind, double-dummy,randomised controlled trial. *Lancet.*;373:1253-63.
342. Reid I.R, Bolland M.J, Grey A. (2014). Effects of vitamin D supplements on bone mineral density: a systematic review and meta-analysis. *Lancet*.;383(9912): 146-155.
343. Reid I.R, Ibbertson HK. Calcium supplements in the prevention of steroid-induced osteoporosis. *Am J Clin Nutr.* 1986;44(2):287-290.
344. Reid IR. Effects of calcium supplementation on circulating lipids: potential pharmacoeconomic implications .*Drugs Aging* 2004 ; 21 : 7 - 17
345. Reid, I. R., Ames, R. W., Evans, M. C., Gamble, G. D., & Sharpe, S. J. (2015). Long-term effects of calcium supplementation on bone loss and fractures in postmenopaucal women: a†randomized controlled trial. Amer. J. Med, 98, 331-335.
346. Reid, I. R., Ames, R., Mason, B., Bolland, M. J., Bacon, C. J., Reid, H. E.,& Horne, A. (2010). Effects of calcium supplementation on lipids, blood pressure, and body composition in healthy older men: a randomized controlled trial. The American journal of clinical nutrition, 91(1), 131-139.
347. Reid, I. R., Bristow, S. M., & Bolland, M. J. (2015). Cardiovascular complications of calcium supplements. Journal of cellular biochemistry, 116(4), 494-501.
348. Reid, I. R., Horne, A., Mason, B., Ames, R., Bava, U., & Gamble, G. D. (2005). Effects of calcium supplementation on body weight and blood pressure in normal older women: a randomized controlled trial. The Journal of Clinical Endocrinology & Metabolism, 90(7), 3824-3829.
349. Reid, I. R., Mason, B., Horne, A., Ames, R., Clearwater, J., Bava, U., & Gamble, G. D. (2002). Effects of calcium supplementation on serum lipid concentrations in normal older women.A randomized controlled trial. The American journal of medicine, 112(5), 343-347.
350. Reid, I. R., Mason, B., Horne, A., Ames, R., Reid, H. E., Bava, U.& Gamble, G. D. (2006). Randomized controlled trial of calcium in healthy older women. The American journal of medicine, 119(9), 777-785.
351. Reid, Ian R., Ames, R. W., Evans, M. C., Gamble, G. D., & Sharpe, S. J. (2013). Long-term effects of calcium supplementation on bone loss and fractures in postmenopausal women. Obstetrical &Gynecological Survey, 50(10), 733-735.
352. Reid, L. J., Muthukrishnan, B., Patel, D., Seckl, J. R., & Gibb, F. W. (2019). Predictors of nephrolithiasis, osteoporosis, and mortality in primary hyperparathyroidism. *The Journal of Clinical Endocrinology & Metabolism*, 104(9), 3692-3700.
353. Reinwald S, Weaver CM, Kester JJ. The health benefits of calcium citrate malate: a review of the supporting science. Adv FoodNutr Res 2008;54:219-346. Recker RR. Calcium absorption and achlorhydria. N Engl J Med 2000; 313:70-73.
354. Reinwald, S., Weaver, C. M., & Kester, J. J. (2008). The health benefits of calcium citrate malate: a review of the supporting science. *Advances in food and nutrition research*, *54*, 219-346.
355. Reventlow, S. D. (2007). Perceived risk of osteoporosis: restricted physical activities Qualitative interview study with women in their sixties. Scandinavian Journal of Primary Health Care, 25(3), 160-165.
356. Rizzoli, R., Bianchi, M. L., Garabédian, M., McKay, H. A., & Moreno, L. A. (2010). Maximizing bone mineral mass gain during growth for the prevention of fractures in the adolescents and the elderly. Bone, 46(2), 294-305.
357. Rizzoli, R., Biver, E., & Brennan-Speranza, T. C. (2021). Nutritional intake and bone health. The lancet Diabetes & endocrinology, 9(9), 606-621.
358. Rizzoli, R., Stevenson, J. C., Bauer, J. M., van Loon, L. J., Walrand, S., Kanis, J. A., & Reginster, J. Y. (2014). The role of dietary protein and vitamin D in maintaining musculoskeletal health in postmenopausal women: a consensus statement from the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO). Maturitas, 79(1), 122-132.
359. Roberts, W. E., Huja, S., & Roberts, J. A. (2004, June). Bone modeling: biomechanics, molecular mechanisms, and clinical perspectives. In Seminars in orthodontics (Vol. 10, No. 2, pp. 123-161). WB Saunders.

360. Robertson, M. C., Campbell, A. J., Gardner, M. M., & Devlin, N. (2002). Preventing injuries in older people by preventing falls: A meta-analysis of individual-level data. Journal of the American geriatrics society, 50(5), 905-911.
361. Robling A.G, Castillo AB, Turner CH (2006).Biomechanical and molecular regulation of bone remodeling. *Annual review of BiomedicalEngenieering*; 8: 455-498.
362. Robling, A.G. (2009). Is bone's response to mechanical signals dominated by muscle forces *Medicine and science in sports and exercise*, *41*(11), 2044.
363. Rogers, R.S., & Hinton, P. S. (2010). Bone loading during young adulthood predicts bone mineral density in physically active, middle-aged men. *The Physician and Sportsmedicine*, *38*(2), 146-155.
364. *Rogol, A.D., Clark, P. A., & Roemmich, J. N. (2000). Growth and pubertal development in children and adolescents: effects of diet and physical activity. The American journal of clinical nutrition, 72(2), 521S-528S..*
365. Rolfes, S. R., Pinna, K., & Whitney, E. (2014). *Understanding normal and clinical nutrition*. Cengage learning.
366. Ros, E. (2010). Health benefits of nut consumption. *Nutrients*, *2*(7), 652-682.
367. Rose M.L, Hincke M.T (2009). Protein constituents of the eggshell: eggshell-specific matrix proteins. Cellular and Molecular Life Sciences, 66(16):2707-19.
368. Rosen, H. N. (2019). Patient education: Calcium and vitamin D for bone health (Beyond the Basics).
369. Ross A.C, Taylor C.L, Yaktine A.L, et al., (2011) editors. Institute of Medicine (US) Committee to Review Dietary ReferenceIntakes for Vitamin D and Calcium. *Dietary Reference Intakes for Calcium and Vitamin D.* Washington (DC): NationalAcademies Press (US).
370. Ross, A.C., Manson, J.E., Abrams, S.A.,Aloia, J.F., Brannon, P.M., Clinton, S.K., Durazo-Arvizu, R.A., Gallagher, J.C., Gallo, R.L., Jones, G., et al. The 2011 report on dietary reference intakes for calcium and vitamin D from the Institute of Medicine: what clinicians need to know. J. Clin. Endocrinol. Metab. 2011, 96,53-58.
371. Rosset, Peter M., BraulioMachín Sosa, A.M.Roque Jaime and Dana Rocío Ávila Lozano (2011) 'The Campesino-to-CampesinoAgroecology Movement of ANAP in Cuba: Social process methodology in the construction of sustainable peasant agriculture and food sovereignty', Journal of Peasant Studies 38 (1): 1-31.
372. Rossouw, C. M., Vergeer, W. P., Du Plooy, S. J., Bernard, M. P., Ramirez, F., & De Wet, W. J. (1987). DNA sequences in the first intron of the human pro-alpha 1 (I) collagen gene enhance transcription. Journal of Biological Chemistry, 262(31), 15151-15157..
373. Roux, C., Fournier, B., Laugier, P., Chappard, C., Kolta, S., Dougados, M., & Berger, G. (1996). Broadband ultrasound attenuation imaging: a new imaging method in osteoporosis. Journal of Bone and Mineral Research, 11(8), 1112-1118..
374. Rovenský, J., Stancíková, M., Masaryk, P., Svík, K., & Istok, R. (2003). Eggshell calcium in the prevention and treatment of osteoporosis. *International journal of clinical pharmacology research*, *23*(2-3), 83-92.
375. Rowe, I.J., & Baber, R.J. (2021). The effects of phytoestrogens on postmenopausal health. *Climacteric*, *24*(1), 57-63.
376. Rozenberg, S., Body, J. J., Bruyere, O., Bergmann, P., Brandi, M. L., Cooper, C., & Reginster, J. Y. (2016). Effects of dairy products consumption on health: benefits and beliefs-a commentary from the Belgian Bone Club and the European Society for Clinical and Economic Aspects of Osteoporosis, Osteoarthritis and Musculoskeletal Diseases. Calcified tissue international, 98(1), 1-17.
377. Rubin, K. H., Abrahamsen, B., Friis-Holmberg, T., Hjelmborg, J. V., Bech, M., Hermann, A. P & Brixen, K. (2013).Comparison of different screening tools (FRAX®, OST, ORAI, OSIRIS, SCORE and age alone) to identify women with increased risk of fracture.A population-based prospective study. *Bone*, *56*(1), 16-22.
378. Ruel, M. T. November 2003. Operationalizing dietary diversity: a review of measurement issues and research priorities. *J. Nutr*, *133*(11).
379. Russo, D., Miranda, I., Ruocco, C., Battaglia, Y., Buonanno, E., Manzi, S., & Andreucci, V. E. (2007). The progression of coronary artery calcification in predialysis patients on calcium carbonate or sevelamer. Kidney international, 72(10), 1255-1261.
380. Sahni, S., Broe, K. E., Tucker, K. L., McLean, R. R., Kiel, D. P., Cupples, L. A., & Hannan, M. T. (2014). Association of total protein intake with bone mineral density and bone loss in men and women from the Framingham Offspring Study. *Public health nutrition*, *17*(11), 2570-2576.

381. Sahni, Shivani & Kiel, Douglas. (2015). Smoking, Alcohol, and Bone Health. 10.1007/978-1-4939-2001-3.
382. Sahota O, Mundey M., San P, Godber I., Lawson N, Hosking D. The relationship between vitamin D and parathyroid hormone: calcium homeostasis, bone turnover, and bone mineral density in postmenopausal women with established osteoporosis. *Bone*. 2004;35(1):312-319.
383. Sakai, S., Hien, V. T. T., Tuyen, L. D., Duc, H. A., Masuda, Y., & Yamamoto, S. (2017). Effects of eggshell calcium supplementation on bone mass in postmenopausal Vietnamese women. *Journal of nutritional science and vitaminology*, *63*(2), 120-124.
384. Salem I.S., Ammar A.S., Habiba, R.A. (2012): Effect of eggshell powder addition as a source of calcium fortification on butter cake quality. Journal of Agricultural and Veterinary Sciences, 5: 109-118.
385. Santoro, N., Epperson, C. N., & Mathews, S. B. (2015). Menopausal symptoms and their management. *Endocrinology and Metabolism Clinics*, *44*(3), 497-515.
386. Sarath Lekamwasam & Lalith Wijayaratne & Mahinda Rodrigo & Udual Hewage. (2009) . Prevalence and determinants of osteoporosis among men aged 50 years or more in Sri Lanka: a community-based cross-sectional study. Arch Osteoporos 4:79-84.
387. Sarkis, K. S., Salvador, *M. B*., Pinheiro, M. M., Silva, R. G., Zerbini, C. A., & Martini, L. A. (2009). Association between osteoporosis and rheumatoid arthritis in women: a cross-sectional study. Sao Paulo Medical Journal, 127, 216-222.
388. Sathiparan, N. (2021). Utilization prospects of eggshell powder in sustainable construction material-A review. *Construction and Building Materials*, *293*, 123465.
389. Schaafsma A, Pakan I, Hofstede G J H, Muskiet F A J, Van Der Veer, E, De Vries P J F (2000). Mineral, amino acid, and hormonal composition of chicken eggshell powder and the evaluation of its use in human nutrition. Poultry Science, 79(12), 1833-1838.
390. Schaafsma A., Pakan I. (1999): Short term effects of a chicken eggshell powder enriched dairy-based products on bone mineral density in persons with osteoporosis or osteopenia. Bratislavskelekarskelisty, 100: 651-656.
391. Schaafsma A., van Doormaal J.J., Muskiet F.A., Hofstede G.J., Pakan I., van der Veer E. (2002): Positive effects of a chicken eggshell powder-enriched vitamin-mineral supplement on femoral neck bone mineral density in healthy late postmenopausal Dutch women. British Journal of Nutrition, 87: 267-275
392. Schaafsma, A. and Beelen, G.M. 2009. Eggshell powder, a comparable or better source of calcium than purified calcium carbonate: Piglet studies. J. Sci. Food Agri. 79, 1596-1600.
393. Schaafsma, A., Pakan, I., Hofstede, G. J. H., Muskiet, F. A., Van Der Veer, E., & De Vries, P. J. F. (2000). Mineral, amino acid, and hormonal composition of chicken eggshell powder and the evaluation of its use in human nutrition. *Poultry science*, *79*(12), 1833-1838.
394. Schousboe JTSJ, Bilezikian JP, Baim S. (2013). Executive Summary of the 2013 ISCD Position Development Conference onBone Densitometry. *J Clin Densitom*;16:455-66.
395. Schurch M, Rizzoli R, Mermillod B, Vasey H, Michel J, Bonjour J. A prospective study on socioeconomic aspects of fracture of the proximal femur. J Bone Miner Res. 2006;11:2000-42.
396. Schwab, P., & Klein, R. F. (2008). Nonpharmacological approaches to improve bone health and reduce osteoporosis. *Current opinion in rheumatology*, *20*(2), 213-217.
397. Schwartz A.V, Sellmeyer D.E, Ensrud K.E, et al.Study of Osteoporotic Features Research Group Older women with diabetes have an increased risk of fracture: a prospective study. *J Clin Endocrinol Metab.* 2001;86(1):32-38.
398. *Scientific Advisory Committee on Nutrition. Vitamin D and Health 2016.*; 2016.
Seeman E, Delmas P.D. Bone quality--the material and structural basis of bone strength and fragility. *N Engl J Med.*2006;354:2250–61. https://doi.org/10.1056/NEJMra053077.
399. Seeman E. (2009).Bone modeling and remodeling.Critical Review in Eukaryotic Gene Expression.19(3).
400. Seeman, E. (2006). Strontium ranelate: vertebral and non-vertebral fracture risk reduction. Current opinion in rheumatology, 18, S17-S20.
401. Sembuling, K. and Sembuling, P. (2012) Essential of Medical Physiology. 6th Edition, New Jaypee Brothers Medical Publishers, Delhi, India.
402. Senthilraja, M., Cherian, K. E., Jebasingh, F. K., Kapoor, N., Paul, T. V., & Asha, H. S. (2019). Osteoporosis knowledge and beliefs among postmenopausal women: A cross-sectional study from a teaching hospital in southern India. Journal of Family Medicine and Primary Care, 8(4), 1374.
403. Serna, J., & Bergwitz, C. (2020). Importance of dietary phosphorus for bone metabolism and healthy aging. *Nutrients*, *12*(10), 3001.

404. Sethi B.K, Chadha M, Modi K.D, Kumar K.M, Mehrotra R, Sriram U. Efficacy of teriparatide in increasing bone mineraldensity in postmenopausal women with osteoporosis - an Indian experience. *J Assoc Physicians India.* 2008;56:418-424.
405. Shaki, O., Rai, S. K., Gupta, T. P., Chakrabarty, B. K., & Negi, R. S. (2021). To study the awareness of osteoporosis in postmenopausal Indian women in a Northeast part of India: An evaluation of the Osteoporosis Health Belief Scale. Journal of Family Medicine and Primary Care, 10(5), 1950.
406. Sharma, D. K., Anderson, P. H., Morris, H. A., & Clifton, P. M. (2022). Acute CTX-1 suppression with milk calcium or calcium carbonate is independent of visceral fat in a randomized crossover study in lean and overweight postmenopausal women. The Journal of Nutrition.
407. Shariati-Sarabi, Z., Rezaie, H. E., Milani, N., Rezaie, F. E., & Rezaie, A. E. (2018). Evaluation of bone mineral density in perimenopausal period. *Archives of Bone and Joint Surgery*, *6*(1), 57.
408. Sharon Rady Rolfes, Kathryn Pinna, Ellie Whitney Understanding Normal and Clinical Nutrition, Eighth Edition, Chapter 12, Page 418.
409. Shea, B. J., Adachi, J. D., Cranney, A., Griffith, L., Guyatt, G., Hamel, C.,& Zytaruk, N. (2004). Calcium supplementation on bone loss in postmenopausal women. *Cochrane Database of Systematic Reviews*, (1).
410. Sheikh, M. S. (2018). Modified Kuppuswamy scale updated for year 2018. *Indian J Res*, *7*(3), 6-7.
411. Sheng Z, Xu K, Ou Y, Dai R, Luo X, Liu S, et al. Relationship of body composition with prevalence of osteoporosis in central south Chinese post-menopausal women. Clin Endocrinol. 2011;74(3):319-24.
412. Sherwood, L. (2015). *Human physiology: from cells to systems*. Cengage learning.
413. Shim, J. S., Oh, K., & Kim, H. C. (2014). Dietary assessment methods in epidemiologic studies. *Epidemiology and health*, *36*.
414. Silva A S, Nabavi S M (2019). Challenges and foresight of food supplements. Nonvitamin and nonmineral nutritional supplements (Pp. 541-543). Academic Press.
415. Siwach, N,, Yadav, R.C., Dahiya, K., Nanda, S., (2012), Sirohiwal D. Comparative evaluation of isosorbide mononitrateand alendronate in management of postmenopausal osteoporosis. *Arch Gynecol Obstet.*285(4):1019-1023.
416. Skerry, T. M. (2008). The response of bone to mechanical loading and disuse: fundamental principles and influences on osteoblast/osteocyte homeostasis. *Archives of biochemistry and biophysics*, *473*(2), 117-123.
417. Snow-Harter, C. And R. Marcus. (2001).Exercise, BMD, and osteoporosis. In: *Exercise and Sport Sciences Reviews,* J. O. Holloszy (ed.), Baltimore: Williams & Wilkins Pp. 351-388.
418. Soetan, K. O., Olaiya, C. O., & Oyewole, O. E. (2010). The importance of mineral elements for humans, domestic animals and plants: a review. African J Food Sci 4: 200-222.
419. Solomon, D. H., Johnston, S. S., Boytsov, N. N., McMorrow, D., Lane, J. M., & Krohn, K. D. (2014). Osteoporosis medication use after hip fracture in US patients between 2002 and 2011. *Journal of Bone and Mineral Research*, *29*(9), 1929-1937.
420. Sommer, I., Erkkilä, A. T., Järvinen, R., Mursu, J., Sirola, J., Jurvelin, J. S., & Tuppurainen, M. (2013). Alcohol consumption and bone mineral density in elderly women. *Public health nutrition*, *16*(4), 704-712.
421. Sorenson, J. A., Hanson, J., A., & Mazess, R. B., (2008) Precision and accuracy of dual-energy x-ray absorptiometry. J. Bone and Min. Res. 3 (supplement) S126,
422. Soydal, Ç., Özkan, E., Nak, D., Elhan, A. H., Küçük, N. Ö., & Kır, M. K. (2019). Risk factors for predicting osteoporosis in patients who receive thyrotropin suppressive levothyroxine treatment for differentiated thyroid carcinoma. *Molecular Imaging and Radionuclide Therapy*, *28*(2), 69.
423. Sözen, T., Özışık, L., & Başaran, N. Ç. (2017). An overview and management of osteoporosis. *European journal of rheumatology*, *4*(1), 46.
424. Spencer, C. P., Morris, E. P., & Rymer, J. M. (1999). Selective estrogen receptor modulators: Women's panacea for the next millennium?. *American journal of obstetrics and gynecology*, *180*(3), 763-770.
425. Spiegel, D. M., & Brady, K. (2012). Calcium balance in normal individuals and in patients with chronic kidney disease on low-and high-calcium diets. *Kidney international*, *81*(11), 1116-1122.
426. Sreenivasa, R. J., Vasudeva, R. Y., Devindra, S. and Longvah, T. 2014. Analysis of heavy metal concentrations in Indian marine fish using ICP-MS after closed vessel microwave digestion method. Int. J. Anal. Bioanal. Chem. 4, 67-73.
427. Sridhar, C. B., Ahuja, M. M., &Bhargava, S. (2011). Is osteoporosis a nutritional disease. The Journal of the Association of Physicians of India, 18(8), 671-676.

428. Srilakshmi,B. (2018)., Nutritional Science, New age International (p) Ltd publishing house, New Delhi.
429. Srividhya, N. B., Singh, N., Goel, N., Gambhir, J. K., Rathi, V., & Rajaram, S. (2015). Comparison of antiresorptive effect of hormone therapy and ibandronate in postmenopausal osteoporotic women by assessing type I collagen C-telopeptide levels. *Post Reproductive Health*, *21*(2), 48-55.
430. Sterling, R. S. (2011). Gender and race/ethnicity differences in hip fracture incidence, morbidity, mortality, and function. Clinical Orthopaedics and Related Research®, 469(7), 1913-1918.
431. Stone, H., Bleibaum, R., & Thomas, H. A. (2020). *Sensory evaluation practices*. Academic press.
432. Straub, D. A. (2007). Calcium supplementation in clinical practice: a review of forms, doses, and indications. *Nutrition in clinical practice*, *22*(3), 286-296.
433. Strohm D. New reference values for calcium. Ann Nutr Metab 2013; 63: 186-92.
434. Su, N., Yang, J., Xie, Y., Du, X., Chen, H., Zhou, H., & Chen, L. (2019). Bone function, dysfunction and its role in diseases including critical illness. International journal of biological sciences, 15(4), 776.
435. Sugimoto T, Sato M, Dehle FC, Brnabic AJ, Weston A, Burge R. (2016).Lifestyle-related metabolic disorders, osteoporosis, and fracture risk in Asia: a systematic review. *Value Health Reg Issues*. 9:49-56.
436. Sunyecz, J. A. (2008). The use of calcium and vitamin D in the management of osteoporosis. Therapeutics and clinical risk management, 4(4), 827.
437. Szekanecz, Z., Kerekes, G., Végh, E., Kardos, Z., Baráth, Z., Tamási, L., & Shoenfeld, Y. (2016). Autoimmune atherosclerosis in 3D: How it develops, how to diagnose and what to do. *Autoimmunity reviews*, *15*(7), 756-769.
438. Szekanecz, Z., Raterman, H. G., Pethő, Z., & Lems, W. F. (2019). Common mechanisms and holistic care in atherosclerosis and osteoporosis. *Arthritis research & therapy*, *21*(1), 1-10.
439. Szeleszczuk L, Pisklak DM, Kuras M, Wawer I. In vitro dissolution of calcium carbonate from the chicken eggshell: on the study of calcium bioavailability. International Journal of Food Properties 2015;18(12):2791279.
440. Tandon, V. R., Sharma, S., Mahajan, S., Raina, K., Mahajan, A., Khajuria, V., & Gillani, Z. (2014). Prevalence of vitamin d deficiency among Indian menopausal women and its correlation with diabetes: A first Indian cross sectional data. Journal of mid-life health, 5(3), 121.
441. Tang, B. M., Eslick, G. D., Nowson, C., Smith, C., & Bensoussan, A. (2007). Use of calcium or calcium in combination with vitamin D supplementation to prevent fractures and bone loss in people aged 50 years and older: a meta-analysis. The lancet, 370(9588), 657-666.
442. Teegarden, D., Lyle, R.M., McCabe, G.P., McCabe, L.D., Proulx, W.R.; Michon, K., Knight, A.P., Johnston, C.C. & Weaver, C.M. (2008). Dietary calcium, protein, and phosphorus are related to bone mineral density and content in young women. *Am JClin Nutr*, Vol. 68, No. 3, (Sep 2008), Pp. 749-754
443. Teitelbaum SL. (2007).Osteoclasts: what do they do and how do they do it? *The Americanjournal of pathology*,; 170(2): 427-435.
444. Teitelbaum SL. Bone resorption by osteoclasts. *Science*. 2000;289:1504-1508.
445. Thakur R J, Shaikh H, Gat Y, Waghmare R B (2019). Effect of calcium chloride extracted from eggshell in maintaining quality of selected fresh-cut fruits. International Journal of Recycling of Organic Waste in Agriculture, 8: 27-36.
446. Thamsborg, G., Jensen, J. E., Kollerup, G., Hauge, E. M., Melsen, F., & Sorensen, O. H. (2016). Effect of nasal salmon calcitonin on bone remodeling and bone mass in postmenopausal osteoporosis. Bone, 18(2), 207-212.
447. Thomas, M. P. (2010). Calcium and Magnesium in Drinking water: Public Health Significance. Int. J. Environ. Stud. 2010, 67, 612–613.
448. Thornton, K., & Villamor, E. (2016). Nutritional epidemiology.
449. Thorpe, D.L., Knutsen, S.F., Beeson, W.L., Rajaram, S. & Fraser, G.E. (2008a). Effects of meat consumption and vegetarian diet on risk of wrist fracture over 25 years in a cohort of peri- and postmenopausal women. *Public Health Nutr*, Vol. 11, No. 6, (Jun 2008a), Pp. 564-572
450. Thorpe, M. & Evans, E.M. (2011). Dietary protein and bone health: harmonizing conflicting theories. *Nutr Rev*, Vol. 69, No. 4, (Apr 2011), Pp. 215-230
451. Thulkar, J., & Singh, S. (2015). Overview of research studies on osteoporosis in menopausal women since the last decade. Journal of Mid-Life Health, 6(3), 104-107.
452. Tkatch, L., Rapin, C. H., Rizzoli, R., Slosman, D., Nydegger, V., Vasey, H., & Bonjour, J. P. (1992). Benefits of oral protein supplementation in elderly patients with fracture of the proximal femur. *Journal of the American College of Nutrition*, *11*(5), 519-525.

453. Tong, J. J., Xu, S. Q., Zong, H. X., Pan, M. J., Teng, Y. Z., & Xu, J. H. (2020). Prevalence and risk factors associated with vertebral osteoporotic fractures in patients with rheumatoid arthritis. *Clinical Rheumatology*, *39*(2), 357-364.
454. Tong, X., Chen, X., Zhang, S., Huang, M., Shen, X., Xu, J., & Zou, J. (2019). The effect of exercise on the prevention of osteoporosis and bone angiogenesis. BioMed research international, 2019.
455. Trailokya, A., Srivastava, A., Bhole, M., & Zalte, N. (2017). Calcium and calcium salts. *Journal of the Association of Physicians of India*, *65*(2), 100-3.
456. Tuominen JT, Impivaara O, Puukka P, Rönnemaa T. (2009). Bone mineral density in patients with type 1 and type 2 diabetes. *Diabetes Care.* ;22(7):1196-1200.
457. Turner, C. H., & Robling, A. G. (2005). Mechanisms by which exercise improves bone strength. *Journal of bone and mineral metabolism*, *23*(1), 16-22.
458. Tuzun, S., Eskiyurt, N., Akarirmak, U., Saridogan, M., Senocak, M., Johansson, H., & Kanis, J. A. (2012). Incidence of hip fracture and prevalence of osteoporosis in Turkey: the FRACTURK study. *Osteoporosis international*, *23*(3), 949-955.
459. U.S. Department of Health and Human Services. Physical activity and health: a report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, and National Center for Chronic Disease Prevention and Health Promotion, 2006.
460. Unni, J., Garg, R., & Pawar, R. (2010). Bone mineral density in women above 40 years. *Journal of mid-life health*, *1*(1), 19.
461. US Department of Health and Human Services. (2004). Bone health and osteoporosis: a report of the Surgeon General. *Rockville, MD: US Department of Health and Human Services, Office of the Surgeon General*, *87*.
462. Van Der Weijden, M. A. C., Van Denderen, J. C., Lems, W. F., Heymans, M. W., Dijkmans, B. A. C., & Van Der Horst-Bruinsma, I. E. (2011). Low bone mineral density is related to male gender and decreased functional capacity in early spondylarthropathies. *Clinical rheumatology*, *30*(4), 497-503.
463. Van der Weijden, M., Claushuis, T. A. M., Nazari, T., Lems, W. F., Dijkmans, B. A. C., & Van Der Horst-Bruinsma, I. E. (2012). High prevalence of low bone mineral density in patients within 10 years of onset of ankylosing spondylitis: a systematic review. *Clinical rheumatology*, *31*(11), 1529-1535.
464. Van Der Wiel, H. E., P. Lips, W. C. Graafmans,(2005).Additional weight-bearing during exercise is more important than duration of exercise for anabolic stimulus of bone: a study of running exercise in female rats. *Bone.* 16:73- 80.
465. Vannucci, L., Fossi, C., Quattrini, S., Guasti, L., Pampaloni, B., Gronchi, G.& Brandi, M. L. (2018). Calcium intake in bone health: a focus on calcium-rich mineral waters. *Nutrients*, *10*(12), 1930.
466. Vasikaran S, Eastell R, Bruyere O, Foldes AJ, Garnero P, Griesmacher A, et al. *(*2011). Markers of bone turnover for theprediction of fracture risk and monitoring of osteoporosis treatment: a need for international reference standards.*Osteoporos Int.*22:391-420.
467. Vasudevan, B., Karunakaran, U., Antony, A., & Ramachandran, R. (2021). Vitamin D status and associated factors among peri menopausal women in two selected districts of Kerala. *Indian Journal of Public Health*, *65*(2), 166.
468. Vatanparast, H., Bailey, D. A., Baxter-Jones, A. D., & Whiting, S. J. (2007). The effects of dietary protein on bone mineral mass in young adults may be modulated by adolescent calcium intake. *The Journal of nutrition*, *137*(12), 2674-2679.
469. Verma N, Kumar V, Bansal M C (2012). Utilization of eggshell waste in cellulase production by neurospora crassa under wheat bran-based solid-state fermentation. Polish Journal of Environmental Studies, 21(2): 491-497.
470. Vesper H (2004). Application of Biochemical Markers of Bone Turnover in the Assessment and Monitoring of Bone Diseases: Approved Guideline. 24.
471. Villa-Etchegoyen, C., Lombarte, M., Matamoros, N., Belizán, J. M., & Cormick, G. (2019). Mechanisms involved in the relationship between low calcium intake and high blood pressure. *Nutrients*, *11*(5), 1112.
472. Vogt, W. P., & Johnson, B. (2011). *Dictionary of statistics & methodology: A nontechnical guide for the social sciences*. Sage.
473. Vossenaar M, Lubowa A, Hotz C, Deitchler M, Moursi M, Arimond M, Crispim SP, and Arsenault J. 2020. Considerations for the Selection of Portion Size Estimation Methods for Use in Quantitative 24-Hour Dietary Recall Surveys in Low- and Middle-Income Countries. Washington, DC: Intake - Center for Dietary Assessment/FHI Solutions.

474. Vupputuri MR, Goswami R, Gupta N, Ray D, Tandon N, Kumar N. Prevalence and functional significance of 25-hydroxyvitamin D deficiency and vitamin D receptor gene polymorphisms in Asian Indians. *Am J Clin Nutr.*2006;83(6):1411-1419.
475. Wacker, M., & Holick, M. F. (2013). Sunlight and Vitamin D: A global perspective for health. *Dermato-endocrinology*, *5*(1), 51-108.
476. Wade, S. W., Strader, C., Fitzpatrick, L. A., Anthony, M. S., & O'Malley, C. D. (2014). Estimating prevalence of osteoporosis: examples from industrialized countries. *Archives of osteoporosis*, *9*(1), 1-10.
477. Wafa, H., Raja, A., Dhia, K., Nada, B., Imene, Z., & Montacer, K. M. (2019). Risk factors associated with bone loss and occurrence of fragility fractures in rheumatoid arthritis patients. *The Egyptian Rheumatologist*, *41*(1), 1-5.
478. Waheed, M., Yousaf, M., Shehzad, A., Inam-Ur-Raheem, M., Khan, M. K. I., Khan, M.R& Aadil, R. M. (2020). Channelling eggshell waste to valuable and utilizable products: a comprehensive review. *Trends in Food Science & Technology*, *106*, 78-90.
479. Walsh J.S, Vilaca T. Obesity, type 2 diabetes and bone in adults. *Calcif Tissue Int.* 2017; 100(5):528-535.
480. 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.
481. Watanabe, D., Hotta, M., & Ichihara, A. (2015). Osteomalacia, severe thoracic deformities and respiratory failure in a young woman with anorexia nervosa. *Internal Medicine*, *54*(8), 929-934.
482. Watts NB, Bilezikian JP, Camacho PM, Greenspan SL, Harris ST, Hodgson SF, (2010).American Association of ClinicalEndocrinologists Medical Guidelines for Clinical Practice for the diagnosis and treatment of postmenopausalosteoporosis. *Endocr Pract.*;16(Suppl 3):1-37.
483. Watts, N. B., Bilezikian, J. P., Camacho, P. M., Greenspan, S. L., Harris, S. T., Hodgson, S. F., Kleerekoper, M., Luckey, M. M., McClung, M. R., Pollack, R. P., Petak, S. M., &AACE Osteoporosis Task Force.(2010). American Association of Clinical Endocrinologists Medical Guidelines for Clinical Practice for the diagnosis and treatment of postmenopausal osteoporosis. EndocrinePractice, 16(Suppl. 3), 1-37.
484. Weaver C.M. The growing years and prevention of osteoporosis in later life. Proc Nutr Soc. 2000;59:303-6.
485. Weaver, C. M., Alexander, D. D., Boushey, C. J., Dawson-Hughes, B., Lappe, J. M., LeBoff, M. S.& Wang, D. D. (2016). Calcium plus vitamin D supplementation and risk of fractures: an updated meta-analysis from the National Osteoporosis Foundation. *Osteoporosis International*, *27*(1), 367-376.
486. Webster D (2010). Mechanical loading of mouse caudal vertebrae increases trabecular and cortical bone mass-dependence on dose and genotype. *Biomechanics and modeling inmechanobiology*. 9(6): 737-747.
487. Weiner.J, Halle Amick, Shoou-Yih Daniel Lee., (2008), Conceptualization and Measurement of Organizational Readiness for Change: A Review of the Literature in Health Services Research and Other Fields,Osteoporosis International
488. Weinstein, R. S. True strength. *J. Bone Miner. Res.* 15:621-625, 2000.
489. Weiss, G., Skurnick, J. H., Goldsmith, L. T., Santoro, N. F., & Park, S. J. (2004). Menopause and hypothalamic-pituitary sensitivity to estrogen. *Jama*, *292*(24), 2991-2996.
490. Welch, A. A., & Mulligan, A. (2021). Dietary intake measurement: methodology.
491. Welsey, J., & Renitta, R. E. (2018). Incorporation of chicken eggshell powder into biscuits. *Drug Invention Today*, *10*(4), 3644-3648.
492. Wheeler, D. L., J. E. Graves, G. J. Miller, (2005).Effects of running on the torsional strength, morphometry, and bone mass of the rat skeleton. *Med. Sci. Sports Exerc.* 27:520 -529..
493. WHO classification of bone mineral density -(Lu et al., 2001) Lu, Y., Genant, H. K., Shepherd, J., Zhao, S., Mathur, A., Fuerst, T. P., & Cummings, S. R. (2001). *Classification of Osteoporosis Based on Bone Mineral Densities*.
494. WHO scientific group on the assessment of osteoporosis at primary health care level. World Health Organization 2004.
495. WHO. Guideline: Calcium Supplementation in Pregnant Women; WHO: Geneva, Switzerland, 2013.
496. WHO Recommendations on Antenatal Care for a Positive Pregnancy Experience. Ultrasound Obstet. Gynecol. 2007.
497. WHO Constitution of the World Health Organization. 2018. www.who.int/governance/eb/who constitutionen.pdf.

498. Winters, K. M., And C. M. Snow.(2000)Detraining reverses positive effects of exercise on the musculoskeletal system in premenopausal women. *J. Bone Miner. Res.* 15:2495-2503,
499. Winzenberg, T. M., Oldenburg, B., Frendin, S., & Jones, G. (2003). The design of a valid and reliable questionnaire to measure osteoporosis knowledge in women: the Osteoporosis Knowledge Assessment Tool (OKAT). *BMC musculoskeletal disorders*, *4*(1), 1-7.
500. Wongdee K, Charoenphandhu N. (2011).Osteoporosis in diabetes mellitus: possible cellular and molecular mechanisms. *World J Diabetes.* 2(3):41-48.
501. World Health Organization. (1995). *Physical status: The use of and interpretation of anthropometry, Report of a WHO Expert Committee*. World Health Organization.
502. World Health Organization. (1996). Research on the menopause in the 1990s: report of a WHO scientific group.
503. World Health Organization. (2006). Five keys to safer food manual.
504. Wright NC, Looker AC, Saag KG, Curtis JR, Delzell ES, Randall S, et al. (2014).The recent prevalence of osteoporosis and lowbone mass in the United States based on bone mineral density at the femoral neck or lumbar spine. *J Bone Miner Res.* 29:2520-6.
505. Wright NC, Looker AC, Saag KG, Curtis JR, Delzell ES, Randall S, (2014).The recent prevalence of osteoporosis and lowbone mass in the United States based on bone mineral density at the femoral neck or lumbar spine. *J Bone Miner Res.*;29:2520-6.
506. Wu, W., Zhang, Z., Xiong, T., Zhao, W., Jiang, R., Chen, H., & Li, X. (2017). Calcium ion coordinated dexamethasone supramolecular hydrogel as therapeutic alternative for control of non-infectious uveitis. *Acta biomaterialia*, *61*, 157-168.
507. Xiang, B. Y., Huang, W., Zhou, G. Q., Hu, N., Chen, H., & Chen, C. (2017). Body mass index and the risk of low bone mass-related fractures in women compared with men: A PRISMA-compliant meta-analysis of prospective cohort studies. *Medicine*, *96*(12).
508. Xu, J., Sun, M., Wang, Z., Fu, Q., Cao, M., Zhu, Z., & He, W. (2013). Awareness of osteoporosis and its relationship with calcaneus quantitative ultrasound in a large Chinese community population. *Clinical interventions in aging*, *8*, 789.
509. Yaganza ES, Tweddell RJ, Arul J (2009) Physicochemical basis for the inhibitory effects of organic and inorganic salts on the growth of *Pectobacteriumcarotovorum subsp. carotovorum* and *Pectobacterium-atrosepticum*. Applied and Environmental Microbiology,75:1465-1469. https://doi.org/10.1128/AEM.024 47-08
510. Yang, P., Chen, C., Chiou, H. Y., Li, Y. L., & Hsu, G. S. W. (2017). The exercise intervention may influence the dietary intake and reduce the risk of osteoporosis and sarcopenia in menopausal women. *The FASEB Journal*, *31*, 967-9.
511. Yuhao, S. I., Cenyi, W. A. N. G., Yang, G. U. O., Guihua, X. U., & Yong, M. A. (2019). Prevalence of osteoporosis in patients with type 2 diabetes mellitus in the Chinese mainland: a systematic review and meta-analysis. Iranian Journal of Public Health, 48(7), 1203.
512. Zaid SS et al. (2010).The effects of Tualang honey on female reproductive organs, tibia bone and hormonal profile in ovariectomised rats-animal model for menopause. *BMCcomplementary and alternative medicine*.; 10(1): 82.
513. Zaid, S. S., Sulaiman, S. A., Sirajudeen, K. N., & Othman, N. H. (2010). The effects of Tualang honey on female reproductive organs, tibia bone and hormonal profile in ovariectomised rats-animal model for menopause. *BMC complementary and alternative medicine*, *10*(1), 1-7.
514. Zaidi M. (2007).Skeletal remodeling in health and disease. *Nat Med*.;13:791-801.
515. Zaman, G., Cheng, M. Z., Jessop, H. L., White, R., & Lanyon, L. E. (2000). Mechanical strain activates estrogen response elements in bone cells. *Bone*, *27*(2), 233-239.
516. Zaman, T., Mostari, M., Mahmood, M. A. A., & Rahman, M. S. (2018). Evolution and characterization of eggshell as a potential candidate of raw material. *Cerâmica*, *64*, 236-241.
517. Zamani, M., Zamani, V., Heidari, B., Parsian, H., & Esmaeilnejad-Ganji, S. M. (2018). Prevalence of osteoporosis with the World Health Organization diagnostic criteria in the Eastern Mediterranean Region: a systematic review and meta-analysis. *Archives of osteoporosis*, *13*(1), 1-10.
518. Zhang X, Yu Z, Yu M, Qu X. Alcohol consumption and hip fracture risk. *Osteoporos Int*. 2015;26:531-542.
519. Zhang, T., Whelton, P. K., Xi, B., Krousel-Wood, M., Bazzano, L., He, J.& Li, S. (2019). Rate of change in body mass index at different ages during childhood and adult obesity risk. *Pediatric obesity*, *14*(7), e12513.

520. Zhao, Xiong & Wu, Zi-Xiang & Zhang, Yang & Yan, Yabo & He, Qiang & Cao, Peng-Chong & Lei, Wei. (2011). Anti-osteoporosis activity of Cibotium barometz extract on ovariectomy-induced bone loss in rats. Journal of ethnopharmacology. 137.
521. Zhu, K., & Prince, R. L. (2012). Calcium and bone. *Clinical biochemistry*, *45*(12), 936-942.
522. Zhu, W., & Owen, N. (2017). *Sedentary behavior and health: Concepts, assessments, and interventions*. Human Kinetics.
523. Zwart, S. R., Davis-Street, J. E., Paddon-Jones, D., Ferrando, A. A., Wolfe, R. R., & Smith, S. M. (2005). Amino acid supplementation alters bone metabolism during simulated weightlessness. *Journal of applied physiology*, *99*(1), 134-140.

Website:

1. https://my.clevelandclinic.org/health/diseases/21608-perimenopause 232-246

APPENDIX I

INSTITUTIONAL HUMAN ETHICS COMMITTEE CLERANCE CERTIFICATE

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

Seek and Ye Shall Find

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.Arunmoli (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.AnithaSubash

08thMarch 2022

To
Ms.S.Kalaipriya
Department of Food Service Management and Dietetics
Avinashilingam Institute for Home Science and
Higher Education for Women
Coimbatore – 641 043

Dear S.Kalaipriya,

Ref: Your proposal No. IHEC/21-22/FSMD- 28 entitled "Bone Health and Risk Assessment of Menopausal Women for Osteoporosis and Strategic Diet Care Practices using Calcite Enriched Recipes" resubmitted for approval to IHEC on 02.03.2021.

The Institutional Human Ethics Committee of our University hereby grants approval to your research proposal No. IHEC/21-22/ FSMD-28 entitled "Bone Health and Risk Assessment of Menopausal Women for Osteoporosis and Strategic Diet Care Practices using Calcite Enriched Recipes" resubmitted by you. The Approval number for the same is AUW/IHEC/FSMD-21-22/XPD-28.

We wish you all the best in your research endeavours.

Regards,

S. Uma Mageshwari

Dr.S.Uma Mageshwari
Member Secretary

Institute for Home Science and Higher Education for Women, Coimbatore ★ Avinashilingam
Institutional Human Ethics Committee

APPENDIX II

PARTICIPANT INFORMED CONSENT FORM (PICF)

Unique ID: ____________________________

Title of the project:**"Bone Health and Risk Assessment of Menopausal Women for Osteoporosis and Strategic Diet Care Practices using Calcite Enriched Recipes"**

The research scholar clearly explained the details and the purpose of the study. I have understood the objectives of the study as well as my roles and responsibilities as a study subject. I understand that I have the right to withdraw from the study anytime with or without assigning any reason.

I was also assured that my medical records collected as part of the study would be kept confidential.

Having clearly understood the study, I hereby give my whole-hearted consent to be a part of it and contribute for the benefit of the society.

I agree to take part in the above study.

--------------------------------------- Date:

(Signatures/Left Thumb Impression) Place:

Subject :
Name :
Contact number :
Email ID :
Parent : Father/Mother/Guardian
Name :
Contact number :
Email ID :

This is to certify that the above consent has been obtained in my presence.

Signature of the Investigator

இணைப்பு III

பங்கேற்பாளர் தெரிவித்த ஒப்புதல் படிவம்

தனிப்பட்ட ஐடி.____________________________

திட்டத்தின் தலைப்பு: **"ஆஸ்டியோபோரோசிஸ் மற்றும் கால்சைட் செறிவூட்டப்பட்ட சமையல் குறிப்புகளைப் பயன்படுத்தி மாதவிடாய் நின்ற பெண்களின் எலும்பு ஆரோக்கியம் மற்றும் இடர் மதிப்பீடு மற்றும் மூலோபாய உணவுப் பராமரிப்பு நடைமுறைகள்"**

ஆய்வின் விவரங்களையும் நோக்கத்தையும் புலனாய்வாளர் தெளிவாக விளக்கினார். ஆய்வின் நோக்கங்கள் மற்றும் ஒரு ஆய்வுப் பாடமாக எனது பாத்திரங்கள் மற்றும் பொறுப்புகளைப் புரிந்து கொண்டேன். எந்த காரணமும் இல்லாமல் எந்த நேரத்திலும் ஆய்வில் இருந்து விலக எனக்கு உரிமை உண்டு என்பதை நான் புரிந்து கொள்கிறேன். ஆய்வின் ஒரு பகுதியாக சேகரிக்கப்பட்ட எனது மருத்துவ பதிவுகள் ரகசியமாக வைக்கப்படும் என்றும் எனக்கு உறுதியளிக்கப்பட்டது. அதில் கலந்து கொண்டு சமுதாய நலனுக்காகப் பங்களிக்க என் முழுமனதுடன் சம்மதம் தெரிவிக்கிறேன்.

மேற்கூறிய ஆய்வில் பங்கேற்க ஒப்புக்கொள்கிறேன்.

--------------------------------------- தேதி :

(கையொப்பங்கள் இடது கட்டைவிரல்) இடம் :

பெயர் :
தொடர்பு எண் :
மின்னஞ்சல் முகவரி :
பெற்றோர் : தந்தை/தாய்/பாதுகாவலர்
பெயர் :
தொடர்பு எண் :
மின்னஞ்சல் முகவரி :

எனது முன்னிலையில் மேற்படி ஒப்புதல் பெறப்பட்டதாகச் சான்றளிப்பதற்காகவே இது.

கொள்னை ஆய்வாளரின் கையொப்பம்

APPENDIX III

INTERVIEW SCHEDULE TO ELICIT INFORMATION ON DEMOGRAPHIC PROFILE, ANTHROMOPETRIC MEASUREMENT, PHYSICAL ACTIVITY, EXPOSURE TO SUN LIGHT AND DIETARY ASSESSMENT AMONG SELECTED SUBJECTS

1.	D.No/S	:			
2.	Place or address	:			
3.	Contact number	:		E-mail ID :	
4.	Respondent Name	:			
5.	Religion	:	☐ Hindu	☐ Muslim	
			☐ Christian	☐ Others	
6.	Number of members in the household	:	☐≤4	☐> 4	
			☐ Adult ≥ 18	☐ Children ≤ years	
7.	Type of family	:	☐ Joint	☐ Extended	☐ Nuclear
8.	Demographic details	:	☐ Marital Status	☐ Education	
			☐ Occupation	☐ Employment Status	
9.	Age in years	:			
10.	Relation to Head	:			
11.	Total Family Income (Rs.)	:	☐>=52,73426,355- 52733		

12. Occupation :

☐ Legislators, Senior Officials & Managers
☐ Professionals ☐ Clerks
☐ Technicians and Associate Professionals
☐ Skilled Workers & Shop & market Sales Worker
☐ Skilled Agricultural & Fishery Workers
☐ Craft & Related Trade Workers ☐ Plant & Machine Operators
☐ Elementary Occupation ☐ Unemployed

13.	Work Room/ House room Condition	:	☐ AC	☐ NonAC
14.	Hours and Minutes in AC	:	☐ Days	☐ Hr/min
	Menopausal Symptoms			
	1. Joint and muscular discomfort	:	☐ Yes	☐ No
	2. Physical and mental exhaustion	:	☐ Yes	☐ No
	3. Sleeping problems	:	☐ Yes	☐ No
	4. Hot flushes, sweating	:	☐ Yes	☐ No
	5. Irritability	:	☐ Yes	☐ No
	6. Dryness of vagina	:	☐ Yes	☐ No
	7. Anxiety	:	☐ Yes	☐ No
	8. Depressive mood	:	☐ Yes	☐ No
	9. Sexual problems	:	☐ Yes	☐ No
	10. Heart discomfort	:	☐ Yes	☐ No
	11. Bladder discomfort	:	☐ Yes	☐ No
15.	Physical activity (last 7 days)			
	1. Do you currently have a job or do any unpaid work outside work	:	☐ Yes	☐ No
	2. During last 7 days on how many days did you do vigorous physical activity heavy lifting, heavy construction or climbing up stairs as part of your work	:	☐ Yes	☐ No
	3. If yes how many days per week andtime spent in hours and minutes	:	☐ Days	☐ Hr/min
16.	A. Job Related Physical activity (last 7 days)			
	1. Do you currently have a job or do any unpaid work outside work	:	☐ Yes	☐ No
	2. During last 7 days on how many days did you do moderate physical activity like light carrying loads.	:	☐ Yes	☐ No

Do not include walking as part of this work			
3. If yes how many days per week and time spent in hours and minutes	:	Days	Hr/min
4. During last 7 days on how many days did you do walk as part of work for atleast 10 minutes physical activity	:	Yes	No
5. If yes how many days per week and time spent in hours and minutes	:	Days	Hr/min
B. Transport Related Physical Activity			
6. During the last 7 days, on how many days did you travel in a motor vehicle like a train, bus, car, or tram?	:	Yes	No
7. If yes how many days per week and time spent in hours and minutes	:	Days	Hr/min
8. During last 7 days on how many days did you travel in motor vehicle like train, bus, car, or other motor vehicle at least 10 minutes physical activity	:	Yes	No
9. If yes how many days per week and time spent in hours and minutes	:	Days	Hr/min
10. During last 7 days on how many days did you do bicycle for at least 10 minutesphysical activity	:	Yes	No
11. If yes how many days per week and time spent in hours and minutes	:	Days	Hr/min
12. During last 7 days on how many days did you do walkas part of work to go from one place to place	:	Yes	No
13. If yes how many days per week and time spent in hours and minutes	:	Days	Hr/min
C. House work, house maintenance and caring for family related Physical Activity			
14. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, chopping wood, shoveling snow, or digging in the garden or yard? At least for 10 minutes	:	Yes	No
15. If yes how many days per week and time spent in hours and minutes	:	Days	Hr/min
16. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate activities like carrying light loads, sweeping, washing windows, and raking in the garden or yard?	:	Yes	No
17. If yes how many days per week and time spent on Moderate PA in hours and minutes	:	Days	Hr/min

D. Recreation, sport and Leisure time Physical Activity

1. Not counting any walking you have already mentioned, during the last 7 days, on how many days did you walk for at least 10 minutes at a time in your leisure time?
2. If yes how many days per week and time spent on walking during your Leisure time in hours and minutes inside your home
3. Think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do vigorous physical activities like aerobics, running, fast bicycling, or fast swimming in your leisure time?
4. If yes How much time did you usually spend on one of those days and time spent doing vigorous physical activities in your leisure time?
5. Again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate physical activities like bicycling at a regular pace, swimming at a regular pace, and doubles tennis in your leisure time?
6. If yes How much time did you spent those days doing moderate physical activities in your leisure time?

E.Time Spent Sitting

7. During the last 7 days, how much time did you usually spend sitting on a weekday?
8. During the last 7 days, how much time did you usually spend sitting on a weekend day?
9. Once again, think about only those physical activities that you did for at least 10 minutes at a time. During the last 7 days, on how many days did you do moderate activities like carrying light loads, washing windows, scrubbing floors and sweeping inside your home?
10. If yes how many days per week and time spent on Moderate PA in hours and minutes inside your home

17. Personal Sunlight Exposure Components

Ambient UV

1. Time of day (season / vacation) From___to ____how much time did you spend outdoors

Between 7 and 9am?	:	□ Hr/Day	□ Min/Days
Between 9 and 11 am?	:	□ Hr/Day	□ Min/Days
Between 11am and 1pm	:	□ Hr/Day	□ Min/Days
Between 1 and 3pm?	:	□ Hr/Day	□ Min/Days
Between 3 and 5pm	:	□ Hr/Day	□ Min/Days
Between 5 and 7pm?	:	□ Hr/Day	□ Min/Days

18. Diet Pattern

Veg	:	□ Yes	□ No
Non Veg	:	□ Yes	□ No
Ova Veg	:	□ Yes	□ No

19. Diet Diversity

1. Cereals : rice, wheat, sorghum, millet or any other grain foods made from these(eg., idly, dosai, bread, noodles, porridge or other grain products)upma, pongal, paniyaram : □ Yes □ No
2. White roots and tubers
   White potatoes, white yarn, white cassava, or other foods made from roots : □ Yes □ No
3. Vitamin A rich Vegetables and tubers: Pumpkin, carrot, squash or sweet potato that are orange inside plus locally available vitamin A rich vegetables eg., red sweet pepper
4. Dark green leafy vegetables Amaranth, cassava leaves, spinach
5. Other Vegetables
   Tomatoes, onion,, eggplant other vegetables : □ Yes □ No
6. Vitamin A rich Fruits: ripe mango, cantaloupe, apricot (fresh or dried)ripe papaya, dried peach and 100 % fresh juice from these fruits : □ Yes □ No
7. Other fruits including wild fruits and 100 % fruit juices made from these : □ Yes □ No
8. Organ meat: liver, kidney, heart or other organ meats or blood based foods : □ Yes □ No
9. Flesh meats lamb, goat, chicken, rabbit, beef, duck other birds, : □ Yes □ No
10. Eggs: eggs from chicken, or any other birds egg : □ Yes □ No
11. Fish and Sea food: Fresh or dried fish or shell fish : □ Yes □ No
12. Legumes, nuts and seeds: dried beans, dried peas, lentils, nuts, seeds or foods made from these (eg peanut butter) : □ Yes □ No
13. Milk and milk products : Milk, Cheese, yogurt or other milk products : □ Yes □ No
14. Oils and Fats: Oil, fat or butter added to food or used for cooking : □ Yes □ No
15. Sweets: Sugar, ,honey, ,sweetened soda or sweetened juice drinks ,sugary foods such as chocolates, candies, cookies and cakes : □ Yes □ No
16. Spices Condiments Beverages: Spices (black pepper, salt) Condiments (coy sauce, hot sauce),coffee, tea, other beverages : □ Yes □ No
17. Do you eat anything (meal or snack) outside the home yesterday? : □ Yes □ No

20. Food Frequency of Calcium Rich Foods Consumption Pattern

				Serving Size	Serving No.
1. Cereals and Legumes					
• Bengalgram (whole)	M/W/D/O	• Rajmah	M/W/D/O		
• Horse gram (whole)	M/W/D/O	• Soyabean	M/W/D/O		
2. Millets					
• Raagi	M/W/D/O	• Kodo	M/W/D/O		
• Pearl	M/W/D/O	• Barnyard	M/W/D/O		
• Foxtail	M/W/D/O	• Little	M/W/D/O		
3. Green leafy vegetables					
• Amaranth	M/W/D/O	• Agathi	M/W/D/O		
• Cauliflower greens	M/W/D/O	• Colocassia leaves	M/W/D/O		
• Curry leaves	M/W/D/O	• Drumstick leaves	M/W/D/O		
• Knoll-khol leaves	M/W/D/O	• Coriander leaves	M/W/D/O		
4. Nuts and Oil Seeds					
• Coconut	M/W/D/O	• Sunflower seeds	M/W/D/O		
• Almond	M/W/D/O	• Gingelly seeds	M/W/D/O		
• Mustard seeds	M/W/D/O	• Cumin seeds	M/W/D/O		
5. Fish					
• Bacha	M/W/D/O	• Rohu	M/W/D/O		
• Katla	M/W/D/O	• Neymeen	M/W/D/O		
• mrigal	M/W/D/O				

21. Family History (F/M/PGP/MGP/PR/MR)

1. Obesity	☐ Yes	☐ No
2. Diabetes	☐ Yes	☐ No
3. High / Low Blood Pressure	☐ Yes	☐ No
4. CVD	☐ Yes	☐ No
5. Thyroid dysfunction	☐ Yes	☐ No
6. Epilepsy	☐ Yes	☐ No

22. Anthropometry

1. Ht : --------------cm   2. Wt: --------------Kg

23. Self Case History

1. Obesity	☐ Yes	☐ No
2. Diabetes	☐ Yes	☐ No
3. High / Low Blood Pressure	☐ Yes	☐ No
4. CVD	☐ Yes	☐ No
5. Thyroid dysfunction	☐ Yes	☐ No
6. Epilepsy	☐ Yes	☐ No
7. Under Medications (List Name if possible)	☐ Yes	☐ No
8. Radical Hysterectomy	☐ Yes	☐ No
9. Recently had any fracture / slip	☐ Yes	☐ No
10. Hormone Treatment Patches / tablets / IV medicines		

W Weekly; D Daily; O Occasionally, F Father; M Mother; PGP Paternal Grand Parents; Maternal Grand Parents ; Paternal Relatives, M Maternal Relatives
Fill all these questions without fail and honestly . And do consider that you are doing.

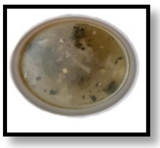
APPENDIX IV
OSTEOPORSIS KNOWLEDGE ASSESSMENT TOOL (OKAT)

1.	Osteoporosis leads to an increased risk of bone fractures	- True/False
2.	Osteoporosis usually causes symptoms(e.g., pain) before fractures occur	- True/False
3.	Having a higher peak bone mass at the end of childhood gives no protection against the development of osteoporosis in later life	- True/False
4.	Osteoporosis is more common in men	- True/False
5.	Cigarette smoking can contribute to osteoporosis	- True/False
6.	White women are at highest risk of fracture as compared to other races	- True/False
7.	A fall is just as important as low bone strength in causing fractures	- True/False
8.	By age 80, the majority of women have osteoporosis	- True/False
9.	From age 50, most women can expect at least one fracture before they die	- True/False
10.	Any type of physical activity is beneficial for osteoporosis	- True/False
11.	It is easy to tell whether I am at risk of osteoporosis by my clinical risk factors	- True/False
12.	Family history of osteoporosis strongly predisposes a person to osteoporosis	- True/False
13.	An adequate calcium intake can be achieved from two glasses of milk a day	- True/False
14.	Ragi and broccoli are good sources of calcium for people who cannot take dairy products	- True/False
15.	Calcium supplements alone can prevent bone loss	- True/False
16.	Alcohol in moderation has little effect on osteoporosis	- True/False
17.	A high salt intake is a risk factor for osteoporosis	- True/False
18.	There is a small amount of bone loss in the 10 years following the onset of menopause	- True/False
19.	Hormone therapy prevents further bone loss at any age after menopause	- True/False
20.	There are no effective treatments for osteoporosis available in India	- True/False

* Winzenberg et al., 2003

APPENDIX - V
METHOD OF PREPARTION OF FORMULATED RECIPES AND ITS NUTRIENT CONTRIBIUTION

1) Garlic Soup



Ingredients :

1. Garlic - 20g
2. Ginger - 5 g
3. Corn flour - 15g
4. Coriander leaves - 10g
5. Onion - 10g
6. Salt - to taste
7. Oil - 2 ml

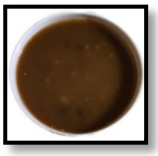
Method of Preparation:

1. Heat oil in a pan, add the finely chopped garlic and onions and sauté on a medium flame for 1 to 2 minutes.
2. Add the vegetable stock, salt, corn flour and pepper, mix well and cook on a medium flame for 2 minutes, while stirring occasionally.
3. Finally add coriander leaves, mix well, and cook on a medium flame for anotherminute.
4. Garlic soup is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Garlic	20g	24.76	1.38	0.03	1.04	4.02	0.21	23.8
Ginger	5g	2.75	0.11	0.04	0.27	0.94	0.1	2.22
Corn Flour	15g	54	0.18	0.03	0.12	-	-	-
Coriander	10g	3.11	0.35	0.07	0.47	14.6	0.53	6.47
Onion	10g	5.66	0.18		0.12	1.99		3.97
TOTAL		90.28	2.2	0.17	13.9	21.55	0.84	36.46

2) Horse Gram Dhal Soup



Ingredients:

1. Horsegram dhal - 50 g
2. Green chillies - 2 g
3. Garlic - 10g
4. Curry leaves - 2g
5. Salt - to taste
6. Lemon - 15 ml

Method of Preparation:

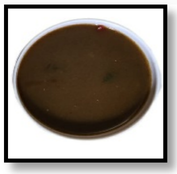
1. Pressure cook the soaked and drained horsegramdhal for 3-4 whistles, till it is mushy and well cooked.
2. Blend 3-4 tbsp of the pressure cooked dhal to form a smooth puree, add this to the boiled horsegram.
3. Now, blend together green chillies, curry leaves and garlic, combine with the boiled horsegram. Drizzle a few drops of lemon juice, mix well and serve hot.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Horsegram Dhal	50g	164.79	10.87	0.31	3.94	134.5	4.38	149
Green Chilli	10g	4.23	0.24	0.07	0.48	1.85	0.12	5.09
Garlic	10g	12.28	0.68	0.01	0.55	1.76	0.09	11.6
Lemon	15ml	5.49	0.06	0.11		3.4	0.02	1.48
TOTAL		186.79	11.85	0.5	4.97	141.51	4.61	167.17

3) Agathikeerai Soup

Ingredients:



1. Agathikeerai leaves - 30 g
2. Salt -to taste
3. Cumin seeds - 5g
4. Toor dhal - 15 g
5. Small onions - 10g
6. Curry leaves - 2g
7. Hing - a pinch

Method of Preparation:

1. To begin with, boil toor dhal and prepare a stock.
2. Separate the agathi leaves from the stem, rinse well,drain the water and set aside.
3. Add water to a pan and bring it to a boil, at this point, add the greens and let it boil for a few more mins till the greens change color and turn soft. Let it cook in medium flame.
4. Simultaneously, add onion, cumin seeds in a pan and sauté till golden brown. Then, add this to thehalf-cooked greens.
5. Boil for a few more minutes till the greens gets cooked.
6. Lower the flame and add the stock, after a single boil agathikeerai soup is ready to serve.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
AgathiKeerai Leaves	30g	21.15	2.4	0.41	2.58	270.3	1.31	15.76
Toor Dal	15g	49.37	3.23	0.8	2.27	6.95	0.91	48.75
Small Onion	10g	5.66	0.18		0.12	1.99		3.97
Cumin Seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1
TOTAL		91.14	6.51	2.04	6.49	323.14	3.25	87.58

4) Soya Chunks Kebab

Ingredients:

1. Soya chunks - 40 g
2. Potato - 20 g
3. Green chilli - 3 g
4. Oil- 10 m

Method of Preparation :

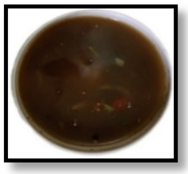
1. Soak soya chunks in water for about half an hour. In another vessel, boil the potato .
2. Grind the Soaked soya chunks in a mixer grinder.
3. Blend and mash potato and soya chunks together and shape the mixture into cutlets.
4. Place a tawa over the flame, add oil and fry the blended ingredients on both the sides until they are cooked, and the soya chunks kebab is ready to serve.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Soya Chunks	40g	138	20.8	0.2	0.4	140	8	-
Potato	20g	12.19	0.27		0.34	1.71	-	7.58
Green Chilli	3g	1.27	0.07	0.02	0.14	0.55	0.04	1.53
Oil	10ml	90	-	10	-	-	-	-
TOTAL		241.46	21.14	10.22	0.88	142.26	8.04	9.11

5) Thoothuvalai Soup

Ingredients:



1. Thoothuvalai leaves - 50 g
2. Small onion - 10g
3. Cumin seeds - 5g
4. Curry leaves - 2g
5. Salt - to taste
6. Toor dhal stock - 20 ml
7. Lemon juice - 15 ml

Method of Preparation :

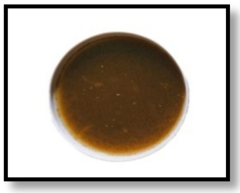
1. Boil the toor dhal and prepare a stock out of it.
2. Rinse thoothuvalai leaves well, drain the water and set aside.
3. Heat water in a pan, once it starts boiling, add the greens and let it boil for few mins till the greens change color and turn soft. Let it cook in medium flame.
4. To a separate pan, add cumin seeds, onion and saute till golden brown. Then add this to half cooked greens.
5. Boil for few more minutes till greens gets cooked. Lower the flame, add the stock and squeeze some lemon juice. Agathikeerai soup is ready to serve.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Small Onion	10g	5.66	0.18	-	0.12	1.99	-	3.97
Oil	5ml	45	-	5	-	-	-	-
Cumin seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1
Lemon	15ml	8.55	1.67	0.14	0.26	10.5	0.04	1.5
TOTAL		74.43	2.55	5.97	1.90	56.39	1.07	24.57

6) Vallarai Soup

Ingredients:



1. Vallarai/brahmi leaves - 20 g
2. Small onions - 10 g
3. Garlic - 3g
4. Ginger - 2 g
5. Pepper - 2g
6. Cumin seeds - 5 g
7. Salt- to taste
8. Oil - 5 ml
9. Lemon - 15 ml

Method of Preparation:

1. Grind the small onions, pepper and ginger to a paste and set aside.
2. Heat oil in a pan, temper with cumin seeds and add the garlic and saute.
3. Now add the onion paste to it and fry.
4. Add salt, vallarai leaves, water and allow it to boil. Once it starts boiling, add the starch water and squeeze lemon juice.
5. Simmer for about 5 minutes. Serve the soup hot.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Small Onion	10g	5.66	0.18	-	0.12	1.99	-	3.97
Oil	5ml	45	-	5	-	-	-	-
Cumin Seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1
Lemon	15ml	5.49	0.06	0.11	-	3.4	0.02	1.48
TOTAL		71.37	0.94	5.94	1.64	49.29	1.05	24.55

7) Egg Fingers

Ingredients :

1. Eggs - 100 g
2. Salt - to taste
3. Red chilli powder - 1/2 tsp
4. Black pepper powder- 1/2 tsp
5. Oil - 5 ml

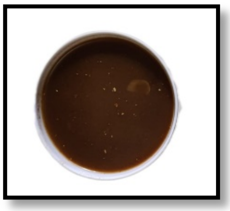
Method of Preparation:

1. Crack the eggs into a bowl. Add salt, black pepper, and red chili powder. Whisk to a smooth froth consistency.
2. Boil water in a saucepan. Pour the whisked mixture and place it in the saucepan with boiling water. Cover the saucepan and allow it to steam for about 5 minutes till the egg hardens.
3. Once cooked, cut the eggs in vertical strips in the form of fingers.
4. Fry the egg fingers in a hot pan on medium flame and sprinkle oil. Cook till they turn golden brown and serve hot.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Egg	100g	134.92	13.28	9.15	-	49.44	1.82	185
Oil	5ml	45	-	5	-	-	-	-
TOTAL		179.92	13.28	14.15	0	49.44	1.82	185

8) Modakkathan Soup



Ingredients :

1. Modakkathan leaves - 20 g
2. Small onions - 10 g
3. Garlic - 3g
4. Pepper - 2g
5. Cumin seeds - 5 g
6. Salt- to taste
7. Oil - 5 ml
8. Lemon - 15 ml

Method of Preparation:

1. Wash the modakkathanleaves and set them aside.
2. Grind small onion, garlic, pepper and cumin seeds into a fine powder
3. Heat water in a pan and boil the leaves for 2 minutes.
4. Then add the ground powder, salt and cook for 15 minutes. Finally, squeeze lemon and the modakkathan soup is reday to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Small Onion	10g	5.66	0.18	-	0.12	1.99	-	3.97
Modakathan	5g	3.05	0.24	0.03	-	-	-	-
Oil	5ml	45	-	5	-	-	-	-
Cumin Seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1
Lemon	15ml	5.49	0.06	0.11	-	3.4	0.02	1.48
TOTAL		74.42	1.18	5.95	1.64	49.29	1.05	24.55

9) Green Gram Dhal Salad

Ingredients:
1. Green gram dhal - 50 g
2. Cumin powder - ½ tsp
3. Kashmiri red chilli powder - ½ tsp
4. Aamchur - ½ tsp
5. Salt - to taste Lemon juice - 5 ml

Method of Preparation:
1. Firstly, blanch 1 cup moong sprouts in 3 cup hot water for 5 minutes, making sure the sprouts are softened, yet a bit crunchy, drain off the water.
2. Add the blanched moong sprouts to a large mixing bowl.
3. Add ½ tsp cumin powder, ¼ tsp chilli powder, ½ tsp aamchur and salt.
4. Mix well making sure the spices are well combined, green gram dhal salad is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Green gram dhal	50g	162.88	11.94	0.68	4.68	21.57	1.97	208
Lemon	5ml	1.83	0.02	0.04	-	1.13	0.01	0.49
TOTAL		164.71	11.96	0.72	4.68	22.7	1.98	208.49

10) Strawberry Salad

Ingredients :
1. Strawberry - 60g
2. cucumber - 60 g
3. white pepper - 1 g
4. Aamchur - 1 g

Method of Preparation:
1. Slice strawberry and cucumber into desired sizes.
2. Toss the sliced strawberry and cucumber with pepper powder and aamchur powder, the salad is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Strawberry	60g	14.77	-		1.5	9.17	-	15.79
Cucumber	60g	11.76	0.43	0.1	1.28	9.83	0.28	17
TOTAL		26.53	0.43	0.1	2.78	19	0.28	32.79

11) Spanish Omlette

Ingredients:

1. Egg - 3 No.s
2. Potato-50g
3. Onion - 50g
4. Wheat flour-20g
5. Cheese- 15 g
6. Green chilli- 3 g
7. Coriander leaves-2g
8. Mint leaves-3 g
9. Pepper- a pinch
10. Salt-a pinch

Method:
1. Grease the pan with oil. Simultaneously, grate the cheese.
2. On low flame, fry the finely chopped potato, green chilli and onion .

3. Beat the eggs, add wheat flour, mint leaves, coriander leaves, pepper, salt, grated cheese, fried potato, green chilli, and onion till they are well combined.Pour this mixture into a pan and cook well on both sides.
4. Now,Spanish omelette is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Egg	150g	202.38	19.92	13.73	-	74.16	2.73	277.5
Potato	50g	30.47	0.68	-	0.85	4.26	-	18.95
Onion	50g	24.02	0.75	-	1.23	10.52	-	16.17
Wheat flour	20g	64.11	2.11	0.31	2.27	6.19	0.82	63
Cheese	15g	49.65	3.17	3.7	-	-	-	-
Green chilli	3g	1.27	0.07	0.02	0.14	0.55	0.04	1.53
Coriander leaves	2g	0.62	0.07	0.01	0.09	2.92	0.11	1.29
Mint leaves	3g	1.11	0.14	-	0.18	6.15	0.26	1.96
TOTAL		373.63	26.91	17.77	4.76	104.75	3.96	380.4

12) Mughlai Paratha

Ingredients:
1. Wheat flour - 50g
2. Potato - 20g
3. Oil - 10mlGarlic - 5g
4. Paneer - 15g

Method of Preparation:
1. Prepare a basic dough using wheat flour, with the addition of water, as needed.
2. On a medium flame, cook the potatoes in water for 3 to 4 whistles. Drain the water and allow the potatoes to cool.
3. Peel the potatoes and mash till no lumps are found.
4. With a spoon, thoroughly mix the spice powders, paneer and green chilies into the mashed potatoes.
5. Roll out the dough into a round shape and stuff the mashed ingredients in the size of a normal roti or chapati.
6. Heat a tawa, grease with oil,cook onboth sides and serve hot .

Nutririve Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Wheat flour	50g	160.29	5.29	0.77	5.68	15.47	2.05	157.5
Potato	20g	12.19	0.27	-	0.34	1.71	-	7.58
Oil	10ml	90	-	10	-	-	-	-
Garlic	5g	6.14	0.34	0.01	0.27	0.88	0.04	5.8
Paneer	15g	38.68	2.83	2.22	-	71.4	0.14	49.5
TOTAL		307.3	8.73	12.3	6.29	89.46	2.23	220.38

13) Ragi Cabbage Adai

Ingredients:
1. Ragiflour - 40g
2. Cabbage - 15 g
3. Onion - 15 g
4. Green chillies -2g
5. Coriander leaves- 2 g
6. Oil - 10 ml

Method of Preparation:
1. Heat 1 tsp of oil, add finely chopped onions, cabbage,green chillies and saute until the onions turn transparent.

2. Allow the above mixture to cool, add ragi flour to the vegetables and mix well. Add water gradually and combine into a batter without any lumps.
3. Grease the tawa and pour the batter and flatten it in circular motion.Cook it well on both sides and serve hot.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Ragi Flour	40g	128.3	2.86	0.77	4.47	145.6	1.85	84
Cabbage	15g	3.23	0.2	0.02	0.41	7.76	0.05	4.52
Onion	15g	8.5	0.27	-	0.17	2.99	-	5.95
Oil	10ml	90	-	10	-	-	-	-
TOTAL		230.03	3.33	10.79	5.05	156.35	1.9	94.47

14) Wheat Garlic Pasta

Ingredients:

1. Wheat flour - 50 g
2. Onion - 100 g
3. Tomato - 100 g
4. Oil - 10 ml
5. Ginger - 10 g
6. Garlic - 10 g

For chutney:

7. Red chilli - 5 g
8. Tomato - 100 g
9. Ginger - 5 g (Finely chopped)
10. Garlic - 5 g (finely chopped)
11. Sugar - 1 teaspoon

Method of preparation of chutney :

1. Boil the red chilli and tomato for 15 minutes, until becomes soft
2. Grind it in a mixer grinder to form a paste
3. Grease the pan with oil, add finely chopped ginger and garlic andsautewell
4. Then add a teaspoon of soya sauce, add the ground mixture and combine well
5. Add a teaspoon of sugar to balance the taste and saute for 5 to 10 more mins
6. Drizzle a teaspoon of lemon, and the chutney is ready to serve.

Method of Preparation:

1. Knead wheat flour into a smooth dough. Then roll into uniformly sized balls,flatten, and spread as a sheet, cut it into small circles and shape it into pasta.
2. Addthe shaped dough to boiling water until the pasta is floating and gets cooked.
3. Heat oil in a pan, add onion, tomato, ginger,garlic and stir fryover medium flame.
4. Then add required amount of salt and chilli powder till it reaches gravy consistency by adding a little amount of water.
5. Add the cooked pasta to the gravy and stir well.
6. Finally, add 2 table spoons of the prepared chutney and cook for 5 mins, home made wheat pasta is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Wheat flour	50g	160.29	5.29	0.77	5.68	15.47	2.05	157.5
Onion	100g	48.04	1.5	-	2.45	21.03	-	32.34
Tomato	200g	39.2	1.8	0.94	3.54	20.34	0.6	37.54
Oil	10ml	90	-	10	-	-	-	-
Ginger	15g	8.25	0.33	0.13	0.8	2.83	0.29	6.65
Garlic	15g	18.43	1.01	0.02	0.82	2.64	0.13	17.4
Red chilly	5g	11.83	0.63	0.32	1.56	4.99	0.31	14
TOTAL		376.04	10.56	12.18	14.85	67.3	3.38	227.89

15) Ragi Roti

Ingredients:

1. Ragi flour -50 g
2. Cumin seeds - 2g
3. Oil - 10 ml
4. Onions - 25g
5. Coriander leaves - 2g
6. Green chilies-2g
7. Curry leaves-2g
8. Salt - to taste

Method of Preparation:

1. To a bowl, add ragi flour, cumin seeds, oil and mix well.
2. To this, add onion, coriander, green chilies, curry leaves, salt, and mix. Following this, add water gradually to form a soft dough.
3. Heat a pan and grease with oil.
4. Brush banana leaves with oil. Take a small portion of the dough and spread it as thin as possible using your fingers.
5. Flip this on hot tawa and gently peel off the leaf.
6. Drizzle oil. After two to three minutes, flip and cook on the other side. Cook evenly, until the roti develops some golden spots, and serve hot.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Ragi flour	50g	160.37	3.58	0.96	5.59	182	2.31	105
Onion	25g	14.16	0.46	-	0.29	4.98	-	9.91
Oil	10ml	90	-	10	-	-	-	-
TOTAL		264.53	4.04	10.96	5.88	186.98	2.31	114.91

16) Methipulav

Ingredients :

1. Cumin seeds - 2g
2. Bay leaf - 1g
3. Black pepper - 1 tsp
4. Star anise - 1g
5. Cinnamon stick - 1g
6. Cloves - 1g
7. Onion - 20g
8. Green chilli - 2g
9. Turmeric - 1 tsp
10. Ginger garlic paste- 10 g
11. Methi leaves - 15g
12. Red chilli powder -1 tsp
13. Basmati rice - 50g
14. Peas - 15g
15. Salt -to taste

Method of Preparation:

1. Begin by adding the spices to a kadai and cook until they turn aromatic. Additionally, add in onions and saute well.
2. Now, add chilli and ginger - garlic paste and sautewell. Furthermore, sautemethi leaves till they shrink to a reduced size.
3. Now add turmeric and chilli powder and saute for a minute.
4. Add in basmati rice that was soaked for 30 minutes, and saute for a minute without breaking the rice grains.
5. Now add peas, water and salt to taste. Stir well and cover and cook till the rice gets cookedcompletely.

6. Finally, serve methi pulao hot.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Rice	50g	182	9.5	3	8.5	55	3.15	-
Methi leaves	15g	57	0.4	1.56	-	-	-	-
Peas	15g	12.19	1.09	-	0.95	4.24	0.24	8.39
Onion	20g	11.33	0.36	-	0.23	3.98	-	7.93
Garlic	5g	6.14	0.34	0.01	0.27	0.88	0.04	5.8
Ginger	5g	2.75	0.11	0.04	0.27	0.94	0.1	2.22
Oil	15ml	135		15	-	-	-	-
TOTAL		406.41	11.8	19.61	10.22	65.04	3.53	24.34

17) Amarant Leaves Dosa

Ingredients:

1. Dosa batter - 50g
2. Onions - 10g
3. Amaranth - 20 g
4. Oil - 10ml
5. Red chilli - 2 g
6. Salt - to taste

Method of Prepration:

1. Grease a pan with oil, add onion, red chilli and fry it for 1 min then add amaranth leaves and stril fry it till leaves becomes soft.
2. Add this to the dosa batter andmix well.
3. Now, heat a tawa and pour batter in a circularmotion starting from the edge of the pan and proceeding to move inwards till the center.
4. Flip the dosa on both sides and serve hot

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Amaranth Leaves	20g	6.12	0.66	0.13	0.88	66	0.93	14.64
Onion	10g	4.8	0.15	-	0.25	2.1	-	3.23
Oil	10ml	90	-	10	-	-	-	-
Rice	10g	35.64	0.79	0.05	0.28	0.75	0.07	9.6
Urad dhal	5g	16.2	1.15	0.08	0.6	2.78	0.23	18.75
TOTAL		152.76	2.75	10.26	2.01	71.63	1.23	46.22

18) Mint Rice

Ingredients:

1. Mint leaves - 20 g
2. Rice - 50 g
3. Coriander leaves - 2 g
4. Chopped ginger and garlic - 3g
5. Red chilly - 5 g
6. Oil - 5 ml

Method of Preparation:

1. Soak the rice and cook it in a pressure cooker.
2. Simultaneously, heat 2 tablespoons of oil in pan.Add thinly sliced onions, red chilli and sauteit till the onions start to turn goldenbrown.
3. Grind the mint into paste and add it into the pan. Stir and saute the masala paste for a minute or two.
4. Add the cooked rice in pan, sauté well and serve hot.

Nutritive value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Rice	50g	178.18	3.97	0.26	1.41	3.75	0.33	48
Onion	25g	14.16	0.46	-	0.29	4.98	-	9.91
Mint Leaves	20g	7.41	0.93	-	1.18	41	1.71	13.05
Red Chilly	5g	11.83	0.63	0.32	1.56	4.99	0.31	14
TOTAL		211.58	5.99	0.58	4.44	54.72	2.35	84.96

19) Manathakkali Leaves Rice

Ingredients:

1. Rice - 50g
2. Onion chopped - 20g
3. Garlic - 5g
4. Ginger - 5g
5. Green chilly - 2g
6. Manathakkalileaves - 15g
7. Salt - to taste
8. Cumin seeds - 2g
9. Oil - 15 ml

Method of Preparation:

1. Wash the rice once and soak in water.
2. Heat a kadai with oil, add cumin and allow it to splutter. Immediately add green chilli and ginger-garlic paste, and saute for a minute.Then add onion and saute until it turns pink and emits a pleasant aroma.
3. Drain the water completely, add rice, saute for 30 seconds over high flame.
4. Finally add manathakkali and saute for a few seconds.Transfer into a pressure cooker.
5. Add salt and mix well. Then bring the stove to low flame and cook for 5 minutes.Open the cooker only after the steam has completely subsided.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Rice	50g	178.18	3.97	0.26	1.41	3.75	0.33	48
Manathakkali leaves	15g	10.2	0.89	0.15	-	61.5	3.08	10.5
Oil	15ml	135	-	15	-	-	-	-
Onion	20g	11.33	0.36	-	0.23	3.98	-	7.93
Garlic	5g	6.14	0.34	0.01	0.27	0.88	0.04	5.8
Ginger	5g	2.75	0.11	0.04	0.27	0.94	0.1	2.22
TOTAL		343.6	5.67	15.46	2.18	71.05	3.55	74.45

20) Bajra Kichadi

Ingredients :

1. Bajra -50g
2. Onion-30g
3. Tomato-25g
4. Oil-15ml

Method of Preparation:

1. Coarsely grind bajra and soak it in water
2. Heat a pan, add oil, onion, tomato and stir well till the vegetables get cooked
3. Add water and bajra, stir for 5 minutes.
4. Then transfer into pressure cooker. Let it cook for 20 minutes, bajra kichadi is ready to consume.

Nutritive Value :

Ingredients	g/ml	Energy (KCal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)	Vit - D (mcg)
Bajra	50g	174	5.48	2.72	5.75	13.68	3.21	144.5	
Onion	30g	16.99	0.55		0.35	5.98		11.9	
Tomato	25g	4.9	0.23	0.12	0.44	2.54	0.08	4.69	
Oil	15ml	135		15					
TOTAL		330.89	6.26	17.84	6.54	22.2	3.29	161.09	

21) Dates and Almond Brownie

Ingredients:

1. Almonds - 20 g
2. Walnuts - 20 g
3. Dates - 30 g
4. Chia seeds- 20 g
5. Sugar - 15g

Method of Preparation:

1. Grind almonds, walnuts and chia seeds into a fine powder
2. Then add de-seeded dates, sugar and grind again with the mixture to form a paste.
3. Then spread the paste into a 2 inch sheet and cut into square shapes, now the brownie is ready to consume.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Dates	30g	93.28	0.71	0.11	2.73	19.84	1.44	21.08
Walnuts	20g	134.27	2.98	112.85	1.08	21	0.64	80
Almond	20g	121.85	4.16	11.78	2.61	46	0.92	89.2
Sugar	15g	59.7	0.02	-	-	1.8	0.02	0.15
Chia seeds	20g	97.2	3.31	6.15	6.88	126.2	1.54	172
TOTAL		506.3	11.18	130.89	13.3	214.84	4.56	362.43

22) Carrot Kheer

Ingredients:

1. Carrots - 30g
2. Milk - 800 ml
3. Jaggery - 30g
4. Ghee -1 tsp
5. Cardamom powder - a pinch

Method of Preparation:

1. Heat a tsp of ghee and saute the carrots until the raw smell subsides.
2. Simultaneously, in a separate saucepan, bring the milk to a boil, and keep stirring until the volume is reduced.
3. Then grindthe carrots into a paste, add to the boiling milk.
4. Cook for a few more minutes, stirring in between, then add jaggeryand let it dissolve.
5. Remove from flame.Add cardamom powder, saffron and serve it hot or cold.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Carrot	30g	9.97	0.29	0.14	1.25	10.53	0.18	12.92
Milk	800ml	583.17	26.08	35.84	-	944	-	772.48
Jaggery	30g	106.12	0.56	0.05	-	32.1	1.39	22.36
TOTAL		699.26	26.93	36.03	1.25	986.63	1.57	807.76

23) Almond Rabdi

Ingredients:

1. Milk - 1 L
2. Sugar - 50 g
3. Almond - 30 g

Method of Preparation:

1. Boil milk in a pan over medium flame, till it reduces to half the quantity. Add sugar and boil for another 2 minutes.
2. Remove from the flame and allow it to cool.
3. In a separate bowl, soak the almond and grind it
4. Stir the ground almond and cinnamon powder into the reduced milk.
5. Keep it refrigerated and serve chilled.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Milk	1 lit	728.97	32.6	44.8	-	1180	-	965.6
Sugar	50g	199	0.05	-	-	6	0.08	0.5
Almond	30g	182.77	6.24	17.67	3.92	69	1.38	133.8
TOTAL		1110.74	38.89	62.47	3.920	1255	1.46	1099.9

24) Fruit Custard

Ingredients :

1. Milk - 200ml
2. Apple -20g
3. Musk melom - 20g
4. Papaya- 20g
5. Banana- 20g

Method of Preparation:

1. Boil the milk until it is reduced to half of its original quantity.
2. Add sugar to the boiling milk and stir well.
3. Add a teaspoon of custard powder into the milk and mix it without any lumps while stirring continuously.
4. After 2 minutes allow it to cool, add the cut fruit and refrigerate it.
5. Fruit custard is ready to serve cold

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Milk	200ml	145.79	6.52	8.96		236		193.12
Apple	20g	12.76	0.06	0.11	0.41	1.08	0.05	1.68
Musk melon	20g	5.54	0.11	0.05	0.3	1.8	0.04	2.62
Papaya	20g	4.78			0.57	3		3.55
Banana	20g	21.03	0.25	0.07	0.39	1.01	0.06	4.86
TOTAL		189.9	6.94	9.19	1.67	242.89	0.15	205.83

25) Fig Ladoo

Ingredients:

1. Fig - 25g
2. Almond-15g
3. Pista -10g
4. Cashew-5g

Method of Preparation:

1. Firstly, roast 3 tablespoons almonds in a pan over low heat.
2. Roughly chop some dates and 8 dried figs. Also crush 2 green cardamom pods in a mortar-pestle to a coarse powder and discard the peels.

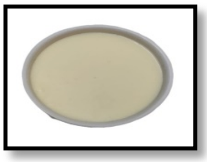
3. To a mixer-grinder add the 1 cup of chopped dates, figs, cashews and the coarsely powdered cardamom powder. Add the roasted almonds as well.Grind to a coarse mixture.
4. Spread on a tray and form small balls using your hands, and the fig laddoos are ready to eat.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Fig	25g	20.38	0.51	0.09	1.16	19.63	0.17	5.41
Almond	15g	91.38	3.12	8.84	1.96	34.5	0.69	66.9
Pista	10g	53.94	2.34	4.25	1.06	13.5	0.45	53.7
Cashew	5g	29.13	0.94	2.26	0.19	1.7	0.3	25
TOTAL		194.83	6.91	15.44	4.37	69.33	1.61	151.01

26) Sweet Yoghurt

Ingredients:



1. Yoghurt - 100ml
2. Sugar - 50 g
3. Milk - 200 ml

Method of Preparation:

1. Boil the milk in a pan, on a medium flame until it is reduced to half its original volume.
2. Add sugar to another pan and heat over a low flame till it melts. Allow the sugar to caramelize.
3. Add the reduced milk to the caramelized sugar and blend well.
4. When the milk and sugar are thoroughly mixed, add curd to the mixture and stir gently till they are well combined.
5. Pour into the desired container and keep in a warm dark spot for it to set.
6. Chill for a few hours and serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Curd	100ml	60	3.1	4	-	149	0.2	93
Sugar	50g	199	0.05	-	-	6	0.08	0.5
Milk	200 ml	145.79	6.52	8.96	-	236	-	193.12
TOTAL		404.79	9.67	12.96	-	391	0.28	286.62

27) Ragi Vermicelli Payasam

Ingredients:

1. RagiVermicelli - 30g
2. Jaggery -30 g
3. Milk - 200 ml
4. Cardamom powder - ½ tbsp

Method of Preparation:

1. Roast the ragi vermicelli in a pan
2. Meanwhile boil the milk until it thickens.
3. Add jaggery to the boiling milk and mix well.
4. Now add the roasted ragi vermicelli to the milk and cook for 3 minutes. Finally add cardamom powder and mix well.
5. Ragi vermicelli payasam is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Ragi semolina	30g	96.22	2.15	0.58	3.35	109.2	1.39	63
Milk	200ml	145.79	6.52	8.96	-	236	-	193.12
Jaggery	30g	106.12	0.56	0.05	-	32.1	1.39	22.36
TOTAL		348.13	9.23	9.59	3.35	377.3	2.78	278.48

28) Shrikhand

Ingredients:

1. Curd - 100ml
2. Sugar - 30 g
3. Cardomom powder - 1 tsp

Method of Preparation:

1. Take a deep and broad bowl and place a large strainer on it. Spread a clean muslin cloth over it and add the plain curd in the center
2. Wrap the muslin cloth from all sides and tie it tightly.
3. After 6-7 hours, untie the muslin cloth and transfer the thick strained curd to a bowl.
4. Add powdered sugar and cardamom powder.
5. Mix properly using a hand beater or a spoon until smoothand serve it cold.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Curd	100ml	60	3.1	4	-	149	0.2	93
Sugar	30g	119.4	0.03	-	-	3.6	0.05	0.3
TOTAL		179.4	3.13	4	-	152.6	0.25	93.3

29) Banana Honey Desert

Ingredients:

.Banana-100g

1. Honey-20ml
2. Raisins-5g
3. Ghee - 2 ml

Method of Preparation:

1. Peel the banana, mash it and add honey to it
2. Greasea tawa with ghee, fry the rainsins and mashed banana for 30 seconds
3. Now, the banana honey dessert is ready to serve

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Banana	100g	105.16	1.23	0.33	1.94	5.07	0.28	24.32
Honey	20ml	63.8	0.06	-	-	1	0.14	3.2
Raisins	5g	15.28	0.13	-	0.2	3.66	0.34	3.88
TOTAL		184.24	1.42	0.33	2.14	9.73	0.76	31.4

30) Sweet Bajra Porridge

Ingredients:

1. Bajra Flour - 50g
2. Cardamom Powder - 2g
3. Jaggery - 30g

Method of Preparation:

1. Toa vessel add bajra powder and water.Whisk well so that there are no lumps and boil it over medium flame.
2. To prepare the syrup, place a pan over the heat and add jaggery and water. Mix well till it melts completely. Keep stirring till it becomes thick and shiny.
3. At this stage strain and add the syrup into bajra porridge. Mix well then add cardamom powder and cook for 5 mins.
4. Now sweet bajra porridge is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Bajra	50g	174	5.48	2.72	5.75	13.68	3.21	144.5
Jaggery	30g	106.12	0.56	0.05		32.1	1.39	22.36
TOTAL		280.12	6.04	2.77	5.75	45.78	4.6	166.86

31) Egg Patties

Ingredients :

1. Eggs - 75g
2. Coriander leaves chopped - 4g
3. Gram flour (besan) - 25g
4. Garam masala powder - 4g
5. Lemon juice - 4g
6. Salt - to taste
7. Chaat masala - 3g
8. Oil - 15 ml

Method of Preparation:

1. Boil the eggs, remove the shells and mash it smoothly.
2. Add the eggs, onion, green chillies, mint leaves, coriander leaves, besan flour, garam masala powder, lemon juice, salt and chaat masala to a deep bowl and mix well.
3. Divide the mixture into eight equal portions and shape each portion into a small flat patty.
4. Heat sufficient amount of oil in a non-stick pan.
5. Shallow-fry the patties, a few at a time, flipping and cooking on both sides, till a golden browncolour is achieved.
6. Drain on absorbent paper. Serve hot with chutney of your choice.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Egg	75g	101.19	9.96	6.86	-	37.08	1.37	138.75
Beasn flour	25g	96.75	5.6	1.67	2.7	11.25	1.22	79.5
Oil	15ml	135	-	15	-	-	-	-
TOTAL		351.75	15.56	23.53	2.7	48.33	2.59	218.25

32) Flax Seed Ladoo

Ingredients :

1. Roasted Gram Dal - 100 g
2. Jaggery - 50 g
3. Cardamom Powder - 5 g
4. Flax seed- 50 g
5. Ghee- 15 g

Method of Preparation:

1. Dry roast the chana dal until it releases the roasted aroma and slightly changes its color. Once it is cold, grind it into a fine powder. Repeat the process with flax seeds.
2. In a large bowl, combine all ingredients including roasted chana dal powder, jaggery, cardamom powder, flax seeds powder, almond meal and ghee.
3. Knead using hands into a ball of mass.
4. Roll them into lemon sized balls and the flax seed ladoos are ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Roasted gramdal	100g	369	22.5	5.2	1	58	9.5	340
Jaggery	50g	176.86	0.93	0.08	-	53.5	2.32	37.27
Cardamon powder	5g	13.53	0.33	0.14	1.17	15.6	0.4	5.85
Flax seed	50g	221.92	9.28	17.84	13.09	128.5	2.72	222.5
Ghee	15g	135	-	15	-	-	-	-
TOTAL		916.31	33.04	38.26	15.26	255.6	14.94	605.62

33) Multigrain Bread Paneer Roll

Ingredients :

1. Multi grain bread - 50 g
2. Paneer - 50 g
3. Ginger garlic paste - 10 g
4. Coriander leaves - 5 g
5. Garam masala - 1 g
6. Salt - 2g
7. Chilli powder - 1 tablespoon

Method of Preparation:

1. Shred the paneer in a bowl, add coriander leaves, garam masala,ginger garlic paste,salt, and mix well.
2. Take 4 slices of multi grain bread cut the crust of bread, sprinkle water and spread it with the help of a rolling pin
3. Stuff the rolled bread slices with the paneer mixture, roll the bread and seal the edges with water.
4. Coat a tawa with oil and let it heat, then fry the bread rolls for 2 mins and serve hot.

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Paneer	50g	128.94	9.43	7.39		238	0.45	165
Ginger garlic paste	10g	6.37	0.27	0.09	-	7	-	-
Coriander leaves	5g	31.07	3.52	0.7	4.66	146	5.3	64.69
Bread	50g	122.5	3.9	-	-	5.5	-	-
TOTAL		280.88	17.12	8.18	4.66	396.5	5.75	229.69

34) Soya Bean Vada

Ingredients :

1. ChannaDal - 50 g
2. Soya Bean - 30g
3. Red Chilli - 8 g
4. Ginger - 3 g
5. Turmeric Powder- 3 g
6. Asafoetida - a pinch
7. Onion -45 g
8. Salt - a pinch
9. Oil- 25 ml
10. Curry Leaves - 3 g

Method of preparation :

1. Soak channa dal and soya bean together with red chilli for 45 minutes, then add ginger and grind into a coarse paste.
2. Add turmeric powder,salt,asafoetida, chopped onion and curry leaves.
3. Roll the mixture into small balls and flatten it with your fingers.
4. Deep fry them in hot oil till they are golden brown.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Channa dal	50g	164.56	10.78	2.66	7.58	23.16	3.04	162.5
Soya bean	30g	113.22	11.34	5.83	6.79	58.5	2.47	148.2
Red chilli	8g	18.93	1.02	0.51	2.49	7.99	0.5	22.4
Ginger	3g	1.91	0,08	0.03	-	2.1	-	-
Onion	45g	21.62	0.68	-	1.1	9.46	-	14.55
Oil	25ml	225	-	25	-	-	-	-
TOTAL		545.24	23.9	34.03	17.96	101.21	6.01	347.65

35) Peanut Chikki

Ingredients:

1. Peanut - 30 g
2. Jaggery - 30g
3. Elachi powder - 2 g

Method of Preparation:

1. Dry roast peanuts in a kadai.
2. Then heat jaggery in a pan with a table spoon of water anddissolve it in low heat.
3. Boiljaggery syrup and stir till it reaches the desired consistency.
4. Then turn off the flame, mixwith roasted peanuts, quickly transfer it to a plate and shape into balls.
5. Now peanut chikki is ready to munch.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Peanut	30g	156.02	7.1	11.89	3.11	16.2	1.03	117.3
Jaggery	30g	106.12	0.56	0.05		32.1	1.39	22.36
TOTAL		172.14	7.66	11.94	3.11	48.3	2.42	139.66

36) Kothimbirvadi

Ingredients

1. Gram flour - 40 g
2. Coriander leaves 50 g
3. Ginger garlic paste - 15 g
4. Green chilli - 10 g
5. White sesame seeds - 10 g
6. Turmeric powder - 3 g
7. Red chili powder - 5 g
8. Coriander powder - 5 g
9. Cumin powder- 5 g
10. Salt - to taste
11. Asafoetida - a pinch
12. Oil - 15 ml

Method of Preparation:

1. Roast the white sesame in a pan. Rinse coriander leaves and chop them.
2. To a bowl add ginger garlic paste,turmeric powder, red chili powder, coriander powder, cumin powder, salt,asafoetida and mix well.
3. Next add the roasted white sesame seeds and gram dhal.Now add water in parts and begin to mix the dough. Combine well till a thick dough is obtained.
4. Shape the dough into balls and flatten it with your hands in the shape of vada. Steam cook the vada for 10 minutes.
5. Grease a pan or tawa with oil. Place the steamed kothimbirvadi and pan fry on medium flame, flip to expose both the sides to heat, and cook till a golden brown colour is obtained.
6. Now kothimbirvadi is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Gram flour	40g	154.8	8.96	2.68	4.32	18	1.94	127.2
Coriander leaves	50g	15.54	1.76	0.35	2.33	73	2.65	32.35
Ginger garlic paste	15g	9.56	0.41	0.13	-	10.5	-	-
Green chilli	10g	4.23	0.24	0.07	0.48	1.85	0.12	5.09
White sesame seed	10g	51.96	2.17	4.31	1.7	128.3	1.5	75.4
Oil	15ml	135	-	15	-	-	-	-
TOTAL		371.09	13.54	22.54	8.83	231.65	6.21	240.04

37) Paneer Cutlet

Ingredients:

1. Paneer -50g
2. Potato -40g
3. Onion - 5g
4. Oil- 10ml
5. Salt - to taste

Method of Preparation:

1. Firstly, wash the potato thoroughly and boil it
2. Meanwhile heat a pan with oil, add onion and stir fry till it turns golden brown.
3. Peel the boiled potato and allow it to cool.
4. In a bowl mash the potato, add onion, grated paneer, chilli powder, salt and mix well to form a dough
5. Make balls out of the dough and flatten it with the hands.
6. Now shallow fry in hot oil on both the sides till it turns golden brown.
7. Hot paneer cutlet is ready to serve

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Paneer	50g	128.94	9.43	7.39	-	238	0.45	165
Potato	40g	24.38	0.54	-	0.68	3.41	-	15.16
Oil	10ml	90	-	10	-	-	-	-
TOTAL		243.32	9.97	17.39	0.68	241.41	0.45	180.16

38) Sesame Seed Balls

Ingredients:

1. Sesame seeds - 100 g
2. Jaggery -75 g
3. Gingelly oil - 2 ml

Method of Preparation :

1. Dry roast the sesame seeds until a roasted aroma emanates from the seeds
2. Grind the sesame seeds and jaggery together in the mixer grinder
3. Knead the powder by adding few drops of oil and shape into balls
4. Now,the sesame balls are ready to serve

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Sesame seeds	100g	507.65	19.17	43.1	17.16	1664	13.9	568
Jaggery	75g	265.3	1.39	0.12	-	80.25	3.47	55.9
Gingelly oil	2ml	135	-	15	-	-	-	-
TOTAL		907.95	20.56	58.22	17.16	1744.25	17.37	623.9

39) Ragi Banana Pancake

Ingredients :

1. Ragi - 75 g
2. Banana - 70 g
3. Palm sugar - 15 g
4. Milk - 30 ml
5. Cardamom powder - 2 g
6. Ghee - 10 ml

Method of Preparation :

1. Take a fully ripe banana, peel the skin and mash it finely
2. Now, add ragi flour, palm sugar and milk to it and combine to form a fine batter
3. Heat the tawa and grease it with ghee

4. Take a ladle full of batter and pour at the center of the pan, taking care to avoid spreading the batter too thin
5. Cover the pan with a lid and let it cook for 1-2 minutes. Flip and cook the other side well
6. Now ragi banana pan cake is ready to serve

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Ragi	75g	240.56	5.37	1.44	8.39	273	3.47	157.5
Banana	70g	73.61	0.86	0.23	1.36	3.55	0.2	17.02
Palm sugar	15g	51	0.15	0.03	-	245.7	-	9.3
Milk	30ml	21.87	0.98	1.34	-	35.4	-	28.97
Cardamon powder	2g	5.41	0.13	0.06	0.47	6.24	0.16	2.34
Ghee	10ml	90	-	10	-	--	-	-
TOTAL		482.45	7.49	13.1	10.22	563.89	3.83	215.13

40) Wheat Flour Appam

Ingredients :

1. Wheat flour - 100 g
2. Banana -50 g
3. Jaggery - 50 g
4. Cardamom powder - 2 g
5. Ghee - 15 ml

Method of Preparation :

1. Grate the jaggery and add into a pan
2. Add water and allow the jaggery to melt, stir well.Filter the jaggery syrup and pour it into a bowl
3. Mash the fully ripe banana and add wheat flour, jaggery syrup, cardamom powder and mix to form a batter
4. Heat the paniyaram tawa and grease it with ghee.
5. Take a ladle full of batter and pour it in the tawa, after a few minutes, flip it to the other side until it gets cooked properly
6. Now wheat flour appam is ready to serve

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Wheat flour	100g	320.57	10.57	1.53	11.36	30.94	4.1	315
Banana	50g	52.58	0.62	0.17	0.97	2.54	0.14	12.16
Jaggery	50g	176.86	0.93	0.08	-	53.5	2.32	37.27
Cardamon Powder	2g	5.41	0.13	0.06	0.47	6.24	0.16	2.34
Ghee	15ml	135	-	15	-	-	-	-
TOTAL		690.42	12.24	16.84	12.8	93.24	6.72	366.77

41) Drumstick Leaves Podi

Ingredients :

1. Drumstick leaves- 35 g
2. Urad dhal-15g
3. Moong dhal-15g
4. Channna dhal - 10g
5. Corriander seeds - 5g
6. Asafoetida- 2g
7. Oil - 2g
8. Red Chillies- 5g

Method of Preparation :

1. Clean the drumstick leaves and drain the water. Set aside for a few minutes to get rid of excess moisture
2. Heat a pan with oil. Add red chillies, asafoetida, chana dal, urad dal, coriander seeds
3. Roast until the dals start to turn golden and remove from heat, transfer to a plate for cooling.
4. Add drumstick leaves in a sprinkled manner; maintain a low to medium flame until it is dry
5. Then, grind everything to a fine powder with salt
6. Drumstick leaves podi is ready to serve

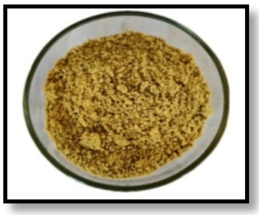
Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Drumstick leaves	35g	23.59	2.24	0.57	2.87	109.9	1.6	38.15
Urad dhal	15g	48.61	3.46	0.25	1.79	8.35	0.7	56.25
Moong dhal	15g	48.86	3.58	0.2	1.41	6.47	0.59	62.4
Channna dhal	10g	32.91	2.16	0.53	1.52	4.63	0.61	32.5
Corriander seeds	5g	13.44	0.53	0.87	2.24	35.9	0.88	14.65
TOTAL		167.41	11.97	2.42	9.83	165.25	4.38	203.95

42) Curry Leaf Podi

Ingredients:

1. Curry leaves- 35g
2. Urad dhal-15g
3. Moong dhal-15g
4. ChannaDhaal - 10g
5. Coriander seeds-5g
6. Cumin seeds- 2 g
7. Red chillies- 5g
8. Turmeric - 3g
9. Oil- 2 g
10. Salt- To Taste



Method of Preparation:

1. Wash the curry leaves let them dry until the moisture evaporates
2. Heat oil and fry urad dhal, moong dhal until a pleasant aroma is emanated
3. Add coriander seeds and red chillies, then add the fully dry curry leaves and fry for about 3-4 minutes.
4. Let the ingredients cool.
5. Add the mixture along with salt and turmeric powder and grind it into a fine powder.
6. Curry leaf podi is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Curry leaves	35g	22.25	2.59	0.37	5.89	230.65	29.15	-
Urad dhal	15g	48.61	3.46	0.25	1.79	8.35	0.7	56.25
Moong dhal	15g	48.86	3.58	0.2	1.41	6.47	0.59	62.4
Channa dhal	10g	32.91	2.16	0.53	1.52	4.63	0.61	32.5
Coriander seeds	5g	13.44	0.53	0.87	2.24	35.9	0.88	14.65
TOTAL		166.07	12.32	2.22	12.85	286	31.93	165.8

43) Groundnut Podi

Ingreients:

1. Groundnut - 35g
2. Garlic - 5g
3. Cumin seeds - 5g
4. Salt - to taste

Method of Preparation:

1. Roast groundnut until they turn aromatic and golden in colour.
2. Heat a pan, add oil, red chillies and fry them to a crisp texture
3. Add salt,cumin seeds and garlic, stir for a few seconds.
4. Cool all the ingredients and grind into a smooth powder.
5. To the same powder add groundnuts and grind them coarsely. Groundnut podi is ready to serve.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Groundnut	35g	182.03	8.28	13.87	3.63	18.9	1.2	136.85
Garlic	5g	6.19	0.35	0.01	0.26	1	0.05	5.95
Cumin seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1
TOTAL		203.44	9.3	14.71	5.41	63.8	2.28	161.9

44) Garlic Podi

Ingredients:

1. Channa dhal - 20g
2. Red chilli- 5 g
3. Urad dhal - 20 g
4. Garlic - 25g
5. Oil- 2 g
6. Salt - To Taste

Method of Preparation:

1. In a pan roast the urad dhal and channa dhal until they turn brown and add the red chillies to this. Remove from the pan and set aside.
2. To another pan add oil and roast the chopped garlic clovesover a medium-low flame
3. Allow all the ingredients to cool completely
4. Then, add the cooled ingredients, salt and grind it into a fine powder in a mixer
5. Now garlic podi is ready to serve

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Channa dhal	20g	65.82	4.31	1.06	3.03	9.26	1.22	65
Urad dhal	20g	64.82	4.61	0.34	2.39	11.13	0.93	75
Garlic	25g	30.95	1.73	0.04	1.31	5.02	0.26	29.75
TOTAL		161.59	10.65	1.44	6.73	25.41	2.41	169.75

45) Toor Dhal Podi

Ingredients:

1. Toor dhal - 35 g
2. Corriander - 10 g
3. Cumin seeds - 5 g
4. Salt - to taste

Method of Preparation:

1. Heat a pan and fry the toordal on medium flame till it changes colour slightly on.
2. Transfer them to a different plate.
3. To the same pan, add 2 tablespoons of black gram and 2 tablespoons of coriander Seeds.
4. Fry till they change colour slightly and transfer into a plate.
5. Fry the dried chillies till they change colour and turn crisp
6. Turn off the flame and let all the ingredients cool down.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Toor dhal	35g	115.77	7.61	0.55	3.17	2.15	1.37	114.8
Corriander seeds	10g	26.89	1.07	1.75	4.48	71.8	1.76	29.3
Cumin seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1
TOTAL		157.88	9.38	3.13	9.17	117.85	4.16	163.2

46) Sesame Seed Podi

Ingredients:

1. Seasmeseedas - 35gToor dal - 35 g
2. Dried Chilies - 3g
3. Black Gram - 4g
4. Coriander Seeds - 10g
5. Cumin Seeds - 5g
6. Salt - To taste

Method of Preparation:

1. Dry roast urad dal till golden brown, set aside. Now add toor dal and red chillies and roast till it is golden brown in color, set aside.
2. Now add sesame seeds and roast it separately till it pops up and is golden. Then set aside to cool down.
3. Add curry leaves in a pan and roast until it is crisp. Cool down all the roasted ingredients completely and then transfer to a mixer jar. Add required salt.
4. Grind to a slightly coarse powder, serve with idli/dosa with sufficient oil.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Sesame seeds	35g	177.68	6.71	15.09	6.01	582.4	4.87	198.8
Corriander seeds	10g	26.89	1.07	1.75	4.48	71.8	1.76	29.3
Cumin seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1
TOTAL		219.79	8.48	17.67	12.01	698.1	7.66	247.2

47) Horse Gram Dhal Podi

Ingredients :

1. Horse gram dhal - 35g
2. Cumin seeds - 5g
3. Pepper - 4g
4. Garlic - 5g
5. Salt - to taste

Method of Preparation:

1. Heat a pan, add horsegram and dry roast it till it starts to sputter. Then add peppercorns, garlic and cumin seeds and dry roast them.
2. Finally add curry leaves to the pan and fry for a few seconds. Then switch off the flame. Cool the roasted ingredients. Transfer all the cooled roasted ingredients with salt to the mixer jar and add garlic cloves
3. Add salt and grind all of these to a nice powder. Store it in an air-tightcontainer

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Horse gram dhal	35g	115.36	7.61	0.22	2.76	94.15	3.07	104.3
Garlic	5g	6.19	0.35	0.01	0.26	1	0.05	5.95
Cumin seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1

48) Sundakkai Vathal Podi

Ingredients:

1. Sundakkaidry - 25g
2. Ural dhal - 15g
3. Cumin Seeds - 5gGarlic - 3 g
4. Oil - 2 g

Method of Preparation:

1. Heat oil in a kadai, add drysundakkai and fry till golden.
2. Add in chillies, cumin seeds, urad dal and fry for a min.
3. Transfer this to a blender, add in garlic and salt.
4. Grind the mixture into a fine powder in a mixer.

Nutritive Value:

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Sundakkai dry	25g	67.25	2.08	0.43	4.4	97.5	5.55	45
Urad dhal	15g	48.61	3.46	0.25	1.79	8.35	0.7	56.25
Cumin seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1
TOTAL		131.08	6.24	1.51	7.71	149.75	7.28	120.35

49) Amlamurabba

Ingredients:

1. Amla - 30g
2. Sugar- 15g

Method of Preparation:

1. Boil plenty of water in a pan, add the amlas and boil for 10 minutes over a high flame. Drain and keep aside.
2. Dissolve the sugar in 3 cups of water and bring the syrup to a boil. Add the amlas and cook over a low flame for about 30 to 40 minutes or until the amlas are soft.
3. Allow the mixture to cool completely. Keep covered in a cool dry place for at least 48 hours, so that the amlas soak in the syrup.
4. On the third day, drain the amlas from the syrup, boil the syrup with cardamom powder and saffron till it reduces to a 2 to 3 string consistency. Add the amlas and simmer for 3 to 4 minutes.
5. Allow the amlamurraba to cool completely and dry in room temperature.

Nutritive Value :

Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Amla	30g	109.2	0.32	0.08	-	-	-	-
Sugar	15g	59.7	0.02	-	-	1.8	0.02	0.15
TOTAL		168.9	0.34	0.08	-	1.8	0.02	0.15

50) Pumpkin Seed Podi

Ingredients:

1. Pumpkin seeds - 35g
2. Corriander seeds - 10g
3. Cumin seeds - 5g
4. White Urad Dal- 4 g
5. Dry Red Chillies - 3g
6. Curry leaves - 2g
7. teaspoon Asafoetida (hing) - 2g
8. Salt - to taste

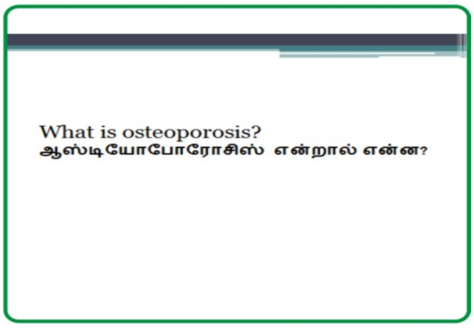
Method of Preparation:

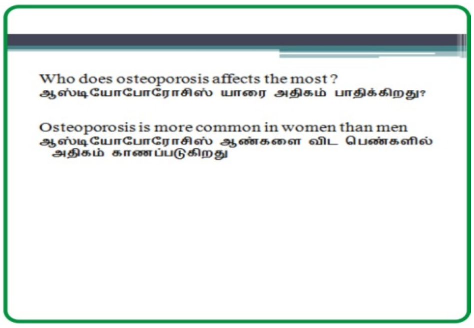
1. To a pan, add the urad dal and roast it till it releases a pleasant aroma. Switch off the flame and transfer it to a plate, spread it on one side.
2. Similarly, roast the dry chillies and transfer it to a plate. Next, add the curry leaves and keep a close watch ensuring that they don't turn brown, but reach a crispy texture.
3. Now heat the pan and switch it off. Add one seed at a time and transfer to the plate. Heat the pan again and repeat the process, then transfer to a plate.
4. Next, add salt and asafoetidato the plate and let all the ingredients cool down for about half an hour.
5. After half an hour, grind the mixture in a jar to get a coarse powder. Now podi is ready to serve.

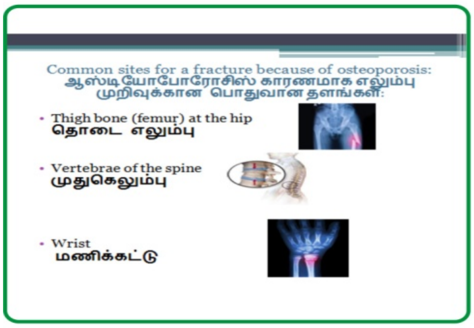
Nutritive Value:

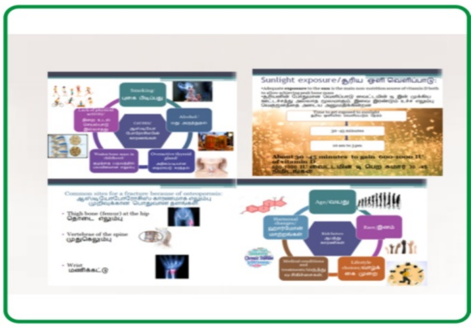
Ingredients	g/ml	Energy (K Cal)	Protein (g)	Fat (g)	Fiber (g)	Calcium (mg)	Iron (mg)	Phosphorus (mg)
Pumpkin seeds	35g	200.9	10.44	17.17	2.28	18.2	2.82	410.9
Corriander seeds	10g	26.89	1.07	1.75	4.48	71.8	1.76	29.3
Cumin seeds	5g	15.22	0.7	0.83	1.52	43.9	1.03	19.1
TOTAL		243.01	12.21	19.75	8.28	133.9	5.61	459.3

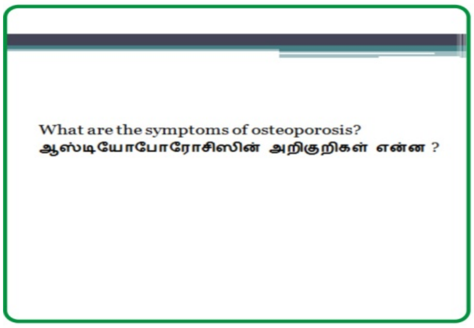
APPENDIX - VI
AWARENESS MATERIAL ON CALCITE AND OSTEOPOROSIS

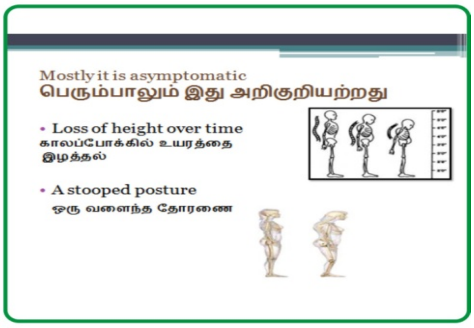


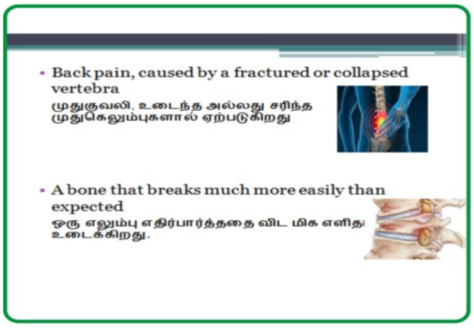


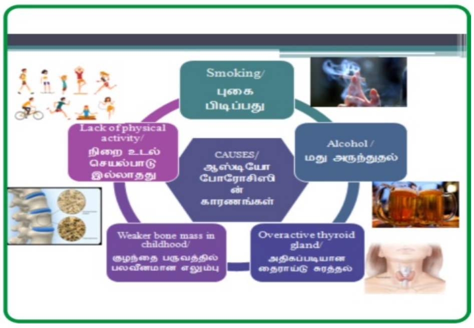


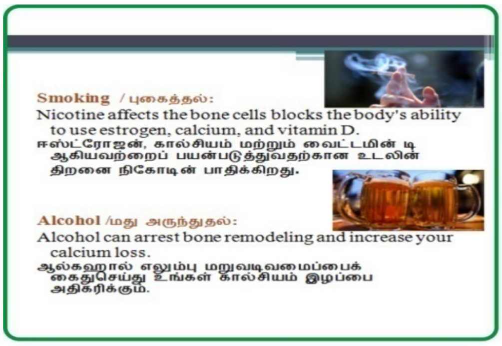




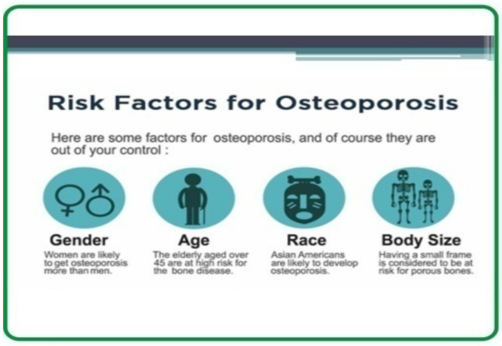


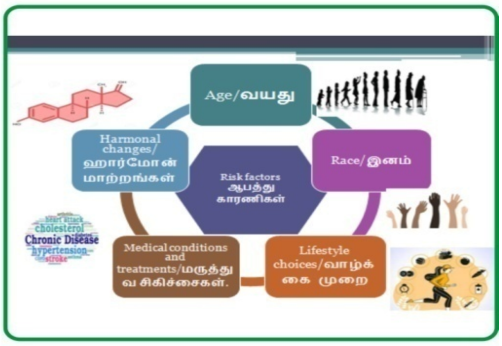





Smoking / புகைத்தல்:
Nicotine affects the bone cells blocks the body's ability to use estrogen, calcium, and vitamin D.
ஈஸ்ட்ரோஜன், கால்சியம் மற்றும் வைட்டமின் டி ஆகியவற்றைப் பயன்படுத்துவதற்கான உடலின் திறனை நிகோடின் பாதிக்கிறது.
Alcohol /மது அருந்துதல்:
Alcohol can arrest bone remodeling and increase your calcium loss.
ஆல்கஹால் எலும்பு மறுவடிவமைப்பைக் கைதுசெய்து உங்கள் கால்சியம் இழப்பை அதிகரிக்கும்.

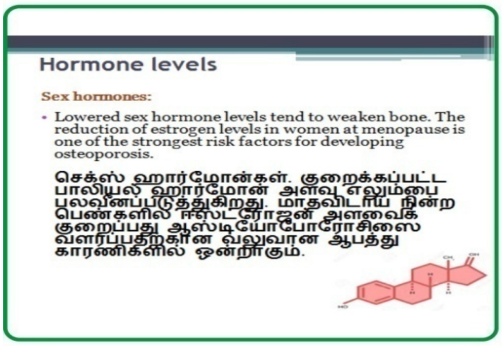

Overactive thyroid gland/தைராய்டு சுரப்பியின் அதிகமான செயல்பாடு:
Too much thyroid hormone (i.e. thyroxine) in the body speeds the rate at which bone is lost.
உடலில் அதிகமான தைராய்டு ஹார்மோன் (அதாவது தைராக்ஸின்) எலும்பு இழக்கப்படும் வேகத்தை வேகப்படுத்துகிறது.
Lack of physical activity/ குறைந்தத உடல் செயல்பாடு:
A physically inactive life style accelerates bone loss and increases the risk of developing osteoporosis
உடல் ரீதியாக செயலற்ற வாழ்க்கை முறை எலும்பு இழப்பை துரிதப்படுத்துகிறது மற்றும் ஆஸ்டியோபோரோசிஸ் உருவாகும் அதிகரிக்கிறது

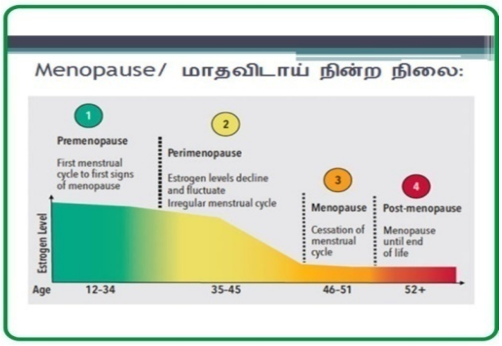

Risk Factors for Osteoporosis
Here are some factors for osteoporosis, and of course they are out of your control :
Gender
Women are likely to get osteoporosis more than men.
Age
The elderly aged over 45 are at high risk for the bone disease.
Race
Asian Americans are likely to develop osteoporosis.
Body Size
Having a small frame is considered to be at risk for porous bones.


Age/வயது
Harmonal changes/ ஹார்மோன் மாற்றங்கள்
Risk factors ஆபத்து காரணிகள்
Race/இனம்
Medical conditions and treatments/மருத்துவ சிகிச்சைகள்.
Lifestyle choices/வாழ்க்கை முறை
heart attack
cholesterol
Chronic Disease
hypertension
stroke

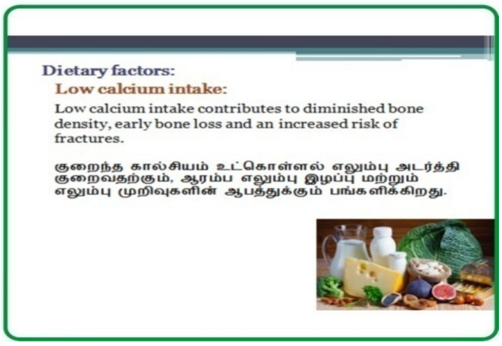

Unchangeable risks:
Gender/பாலினம்:
Women are much more likely to develop osteoporosis than are men.
ஆண்களை விட பெண்களுக்கு ஆஸ்டியோபோரோசிஸ் வருவதற்கான வாய்ப்புகள் அதிகம்.
Age/வயது. :
The older one gets, the greater your risk of osteoporosis.
வயதாகும்போது, ஆஸ்டியோபோரோசிஸ் அபாயம் அதிகம்.
Race/இனம்.:
One is at greatest risk of osteoporosis if you're white or of Asian descent.
நீங்கள் வெள்ளை அல்லது ஆசிய வம்சாவளியைச் சேர்ந்தவராக இருந்தால், உங்களுக்கு ஆஸ்டியோபோரோசிஸ் ஏற்படும் அபாயம் அதிகம்.


Family history/குடும்ப வரலாறு:
Having a parent or sibling with osteoporosis puts one at greater risk, especially if your mother or father fractured a hip.
ஆஸ்டியோபோரோசிஸுடன் ஒரு பெற்றோர் அல்லது உடன்பிறப்பு இருப்பது அதிக ஆபத்தை ஏற்படுத்துகிறது, குறிப்பாக உங்கள் தாய் அல்லது தந்தை இடுப்பை முறித்திருந்தால்.
Body frame size/உடல் சட்ட அளவு:
Men and women who have small body frames tend to have a higher risk because they might have less bone mass to draw from as they age.
சிறிய உடல் பிரேம்களைக் கொண்ட ஆண்களும் பெண்களும் அதிக ஆபத்தை கொண்டிருக்கிறார்கள், ஏனென்றால் வயதுக்கு வரும்போது எலும்பு நிறை குறைவாக இருக்கும்.
LARGE
MEDIUM
SMALL


Hormone levels
Sex hormones:
• Lowered sex hormone levels tend to weaken bone. The reduction of estrogen levels in women at menopause is one of the strongest risk factors for developing osteoporosis.
செக்ஸ் ஹார்மோன்கள். குறைக்கப்பட்ட பாலியல் ஹார்மோன் அளவு எலும்பை பலவீனப்படுத்துகிறது. மாதவிடாய் நின்ற பெண்களில் ஈஸ்ட்ரோஜன் அளவைக் குறைப்பது ஆஸ்டியோபோரோசிஸை வளர்ப்பதற்கான வலுவான ஆபத்து காரணிகளில் ஒன்றாகும்.


Menopause/ மாதவிடாய் நின்ற நிலை:
1
Premenopause
First menstrual cycle to first signs of menopause
2
Perimenopause
Estrogen levels decline and fluctuate
Irregular menstrual cycle
3
Menopause
Cessation of menstrual cycle
4
Post-menopause
Menopause until end of life
Estrogen Level
Age
12-34
35-45
46-51
52+


Thyroid hormone:
Too much thyroid hormone can cause bone loss. This can occur if your thyroid is overactive or if you take too much thyroid hormone medication to treat an underactive thyroid.
தைராய்டு பிரச்சினைகள். அதிக தைராய்டு ஹார்மோன் எலும்பு இழப்பை ஏற்படுத்தும். உங்கள் தைராய்டு செயலற்றதாக இருந்தால் அல்லது செயல்படாத தைராய்டுக்கு சிகிச்சையளிக்க அதிக தைராய்டு ஹார்மோன் மருந்துகளை உட்கொண்டால் இது ஏற்படலாம்.

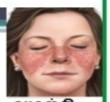

Dietary factors:
Low calcium intake:
Low calcium intake contributes to diminished bone density, early bone loss and an increased risk of fractures.
குறைந்த கால்சியம் உட்கொள்ளல் எலும்பு அடர்த்தி குறைவதற்கும், ஆரம்ப எலும்பு இழப்பு மற்றும் எலும்பு முறிவுகளின் ஆபத்துக்கும் பங்களிக்கிறது.

Eating disorders/உண்ணும் கோளாறுகள் :
Severely restricting food intake and being underweight weakens bone in both men and women.
உணவு உட்கொள்ளலை கடுமையாக கட்டுப்படுத்துவது மற்றும் எடை குறைவாக இருப்பது ஆண்கள் மற்றும் பெண்கள் இருவரையும் எலும்பை பலவீனப்படுத்துகிறது.

Steroids and other medications/ஸ்டெராய்டுகள் மற்றும் பிற மருந்துகள்:

- Seizures/வலிப்புத்தாக்கங்கள்.
- Gastric reflux/இரைப்பை ரிஃப்ளக்ஸ்
- Cancer/புற்றுநோய்
- Transplant rejection/மாற்று நிராகரிப்பு

Medical conditions:



- Celiac disease/ செலியாக் நோய்
- Inflammatory bowel disease/குடல் அழற்சி நோய்
- Kidney or liver disease/சிறுநீரகம் அல்லது கல்லீரல் நோய்
- Cancer/புற்றுநோய்
- Lupus/லூபஸ்
- Multiple myeloma/மைலோமா
- Rheumatoid arthritis/முடக்கு வாதம்

Lifestyle choices:

- Sedentary lifestyle /இடைவிடாத வாழ்க்கை முறை
- Excessive alcohol consumption /அதிகப்படியான மது அருந்துதல்
- Tobacco use/புகையிலை பயன்பாடு.

Who are more prone to osteoporosis ?

ஆஸ்டியோபோரோசிஸ் பாதிப்புக்குள்ளானவர்கள் யார்?

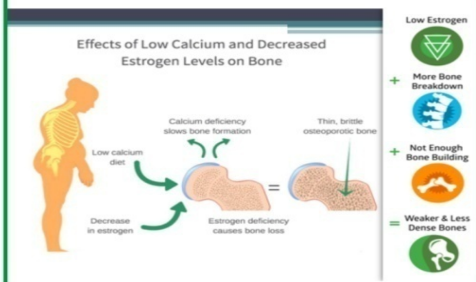
- Women over the age of 50
  50 வயதுக்கு மேற்பட்ட பெண்கள்.

- Asian women than black women
  கருப்பு பெண்களை விட ஆசிய பெண்கள்

- Less calcium intake in childhood and adolescence
  குழந்தை பருவத்திலும் இளமை பருவத்திலும் குறைந்த கால்சியம் உட்கொள்ளல்.

Complications/சிக்கல்கள்

- Bone fracture/எலும்பு முறிவு
- In serious conditions, fracture may happen even from sneezing or minor bumps/ தும்மல் அல்லது சிறிய புடைப்புகளிலிருந்தும் எலும்பு முறிவு ஏற்படலாம்
- Loss of height/உயர இழப்பு
- Loss of mobility/ இயக்கங்களின் இழப்பு
- Instability/உறுதியற்ற தன்மை
- A hunch in the upper back/மேல் முதுகில் ஒரு ஹன்ச்



Diagnosis/நோய் கண்டறிதல்:

- DEXA dual-energy x-ray absorptiometry (DXA or DEXA) or bone densitometry.

Classification of osteoporosis/ ஆஸ்டியோபோரோசிஸின் வகைப்பாடு:

Classification	T-score
Normal /இயல்பான எலும்பு திடம்	>-1.0
Osteopenia/ஆஸ்டியோபீனியா	Between -1 and -2.5
Osteoporosis/ஆஸ்டியோபோரோசிஸ்	<-2.5
Severe osteoporosis/கடுமையான ஆஸ்டியோபோரோசிஸ்	-2.5 and below + fragility fracture

Prevention of Osteoporosis
ஆஸ்டியோபோரோசிஸ் தடுப்பு

Physical activity :

- Exercises are important for building and maintaining bone mass and density
எலும்பு நிறை மற்றும் அடர்த்தியை உருவாக்குவதற்கும் பராமரிப்பதற்கும் பயிற்சிகள் முக்கியம்
- Weight-bearing exercises, in which bones and muscles work against gravity and resistance training that use muscular strength to improve muscle mass and strengthen bone.
எடை தாங்கும் பயிற்சிகள், இதில் எலும்புகள் மற்றும் தசைகள் ஈர்ப்பு மற்றும் எதிர்ப்பு பயிற்சிக்கு எதிராக செயல்படுகின்றன, அவை தசை வலிமையைப் பயன்படுத்தி தசை வெகுஜனத்தை மேம்படுத்தவும் எலும்பை வலுப்படுத்தவும் செய்கின்றன.

Weight bearing exercises :

- Walking /நடைபயிற்சி
- Jogging /ஜாகிங்
- Running /ஓடுதல்
- Stair climbing /படிக்கட்டு ஏறுதல்
- Skipping rope / கயிறு விளையாட்டு

Sunlight exposure/சூரிய ஒளி வெளிப்பாடு:

- Adequate **exposure** to the **sun** is the main non-nutrition source of vitamin D both to allow achieving peak bone mass
- சூரியனின் போதுமான வெளிப்பாடு வைட்டமின் டி இன் முக்கிய ஊட்டச்சத்து அல்லாத மூலமாகும், இவை இரண்டும் உச்ச எலும்பு வெகுஜனத்தை அடைய அனுமதிக்கின்றன

- **About 30 -45 minutes to gain 600-1000 IU of vitamin D**
- **600-1000 IU வைட்டமின் டி பெற சுமார் 30 -45 நிமிடங்கள்**

Osteoporosis risk assessment tool/ ஆஸ்டியோபோரோசிஸ் ஆபத்து மதிப்பீட்டு கருவி

- The Osteoporosis Risk Assessment Instrument (ORAI)
- Osteoporosis Self-Assessment Tool (OST)
- The Simple Calculated Osteoporosis Risk Estimation (SCORE)

Risk assessment of Osteoporosis using clinical tools

OST: Osteoporosis Self assessment Tool **(Weight – Age) × 0.2=score**

variable	scores
OST>1	Low Risk
-3<OST	Moderate Risk
<1	High Risk

- ORAI (Osteoporosis Risk Assessment Instrument):

variable	scores
Age 75≥ 65-74 55-64 44-54	 15 9 5 0
Weight <60 60-69 ≥70	 9 3 0
Estrogen usage No Yes	 2

ORAI >9 scores =(At risk).

(Suzanne *et al.*,2000)

SCORE (Simple Calculated Osteoporosis Risk Estimation):

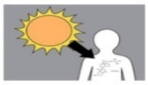
variables	scores
Every gender other than black	5
Rheumatoid arthritis-	4
Non traumatic fractures -	4
-12 scores for >45 years including wrist, rib and hip fracture -	3
Every 10 years without taking estrogens	1

SCORE >6 scores- =At risk

(Lydick *et al.*, 1998)

Diet/உணவு மேலாண்மை :

- Calcium intake per day / ஒரு நாளைக்கு கால்சியம் உட்கொள்ளல் -600 mg/day
- Vitamin D -600 IU
-800 IU (more than 70 years)



Foods to be avoided/தவிர்க்க வேண்டிய உணவுகள்:

- High salt intake/அதிக உப்பு உட்கொள்ள
- Intake of soda /சோடா
- More caffeine/ கா.:.பின்
- processed foods/பதப்படுத்தப்பட்ட உணவு
- Soy bean , wheat bran can be restricted in the diet.
சோயா பீன், கோதுமை தவிடு ஆகியவற்றை உணவில் கட்டுப்படுத்தலாம்.

Nutrient requirement of an adult women per day

Nutrients	Quantity
Energy Sedentary work	1900 K.cal
Medium work	2230 K.cal
Heavy work	2850 K.cal
Fat Sedentary work	20 g
Medium work	25 g
Heavy work	30 g
Protein	55 g
Iron	21 mg
Calcium	600 mg

CHICKEN EGG SHELL POWDER

- Chicken eggshells are roughly 40% calcium, with each gram providing 381–401 mg
- கோழி முட்டைக் கூடுகளில் சுமார் 40% கால்சியம் உள்ளது. ஒவ்வொரு கிராமிலும் 381–401 mg உள்ளது
- calcium absorption was up to 64% greater from eggshell powder compared to pure calcium carbonate.
- தூய்மையான கார்பனேட்டுடன் ஒப்பிடும்போது கால்சியம் உறிஞ்சுதல் முட்டையின் பொடியிலிருந்து 64% அதிகமாக இருந்தது.

Eggshell calcite powder

Chicken egg shell powder → Heated in a muffle furnace for about 900degree Celsius for 4 hours at half an hour interval of every 200 degree raise in temperature. → Calcite Powder

Calcium : 970 mg/1g of calcium

Calcium Rich Recipes- Starters

Garlic soup
Vegetable salad
Masala paneer
Soya chunks kebab
Fish pozhichzdhu
Baby corn salt and pepper fry
Egg fingers
Broccoli carrot salad
Greengram dhal sprouts salad
Strawberry , cucumber salad

Calcium Rich Recipes- Starters

Garlic soup
Vegetable salad
Masala paneer
Soya chunks kebab
Fish pozhichzdhu
Baby corn salt and pepper fry
Egg fingers
Broccoli carrot salad
Greengram dhal sprouts salad
Strawberry , cucumber salad

Desserts

Dates and almond brownie
Carrot kheer
Almond rabdi
Fruit custard
Fig roll
Sweet yogurt
Ragi semolina payasam
Shrikhand
Banana honey dessert
Sweet bajra porridge

Snacks

Cabbage roll
Flaxseed ladoo
Multigrain bread paneer
Soyabean vada
Peanut chikki
Kothimbir vadi
Kala channa
Sesame seed balls
Ragi banana pancake
Wheat flour appam

Ready to eat products

Drumstick leaves podi
Curry leaves podi
Peanut podi
Garlic podi
Thoor dhal powder
Sesame seed powder
Horse gram dhal powder
Sundaikkaivathal powder
Amla murabba
Pumpkin seeds podi

CALCIUM RICH FOODS/கால்சியம் வளமான உணவுகள்:

Food items	Quantity / 100 g
Shrimp (small dried)	6235 mg
Sesame seeds black	1664 mg
Jaggery (coconut palm)	1638 mg
Poppy seeds	1372 mg
Crab muscles	1370 mg
Sesame seeds white	1283 mg
Cinnamon	1002 mg
Khoa	956 mg
Agathi leaves	901 mg
Cumin seeds	878 mg

Cheese	790 mg
Corriander seeds	718 mg
Kuppaimeni keerai	667 mg
Mukarrate keerai	667 mg
Curry leaves	659 mg
Chia seeds	631 mg
Paneer	480 mg
Manathakali leaves	410 mg
Lotus stem	405 mg
Black pepper	405 mg
Sundakai dry	390 mg
Ponnanganni leaves	388 mg
Ragi	364 mg
Soya chunks	350 mg
Crab sea	333 mg

Amaranth leaves (Green)	330 mg
Drumstick leaves	314 mg
Fenugreek leaves	274 mg
Horse gram	269 mg
Flax seed	257 mg
Almond	230 mg
Mint leaves	205 mg
Soya bean white	195 mg
Yogurt	189 mg
Mutton	150 mg
Curd	149 mg
Tamarind pulp	149 mg
Corriander leaves	146 mg
Red gram Whole	139 mg
Pistachio powder	135 mg

Rajma , black	134 mg
Rajma , brown	134 mg
Milk , Buffalo	121 mg
Cluster beans	121 mg
Egg(poultry, yolk,boiled)	120 mg
Milk,cow	118 mg
Paruppu keerai	111 mg
Dragon fruit	107 mg
Walnut	105 mg
Dry red chilli	99.83 mg

Treatment /சிகிச்சை:

- Medication/மருந்து.
- Hormone therapy/ஹார்மோன் சிகிச்சை,
- A healthy diet/ஒரு ஆரோக்கியமான உணவு

APPENDIX VII

AOAOC METHOD OF CALCIUM ANALYSIS

Calcium Analysis:

- Indirect titration with the disodium salt of ethylenediaminetetraacetic acid was used, and the titrations were conducted using a calcium carbonate solution.
- Amounts of MSM (10 g) were digested in a solution of hydrochloric acid, the solution cooled and filtered through filter paper.
- The aliquoted digests were diluted volumetrically with distilled water and potassium hydroxide and potassium cyanide were added; the final pH was 12.5±0.2.
- The solutions were titrated, with the titration end point being the appearance of violet color for the indicator hydroxyinatol blue, but two other indicators were used in parallel: disodium hydroxyphenol blue (end point a purple colour) and eriochrome black T (end point a red colour). (AOAC, 2012)

APPENDIX VIII

AOAOC METHOD OF HEAVY METAL ANALYSIS

Heavy metals analysis:

- Weigh out sample aliquots (typically 0.25 g of as-received or wet sample into microwave digestion vessels.
- Add 4 mL of concentrated HNO3 and 1 mL of 30% hydrogen peroxide (H2O2) to each digestion vessel.
- Add 0.1 mL of the 50 mg/L Au + Lu solution to each digestion vessel.
- Cap the vessels securely (and insert into pressure jackets, if applicable). Place the vessels into the microwave system according to the manufacturer's instructions, and connect the appropriate temperature and/or pressure sensors.
- Samples are digested at a minimum temperature of 190°C for a minimum time of 10 min. Appropriate ramp times and cool down times should be included in the microwave program, depending on the sample type and model of microwave digestion system.
- Microwave digestion is achieved using temperature feedback control. Microwave digestion programs will vary depending on the type of microwave digestion system used. When using this mechanism for achieving performance-based digestion targets, the number of samples that may be simultaneously digested may vary.
- The number will depend on the power of the unit, the number of vessels, and the heat loss characteristics of the vessels. It is essential to ensure that all vessels reach at least 190°C and be held at this temperature for at least 10 min.
- The monitoring of one vessel as a control for the batch/carousel may not accurately reflect the temperature in the other vessels, especially if the samples vary in composition and/or sample mass.
- Temperature measurement and control will depend on the particular microwave digestion system. (AOAC, 2012)

APPENDIX IX

AOAOC METHOD OF MOISTURE CONTENT ANALYSIS

Moisture content analysis:

- Dry the empty dish and transfer the lid in the oven ar 105^{o}c foe 3 hours and transfer to desiccators to cool. Weigh the empty the dish and lid.
- Weigh about 3g of sample to the dish. Soread the sample with spatura.
- Place the dish with sample in the oven.Dry for 3 hours at 105^{o}C
- After drying, transfer the dish with partially covered lid to the desiccators to cool.Reweigh the dish and its dried sample.(AOAC, 2012)

Calculation:

Moisture (%)= [(weight of sample before drying - Weight of sample after drying)X100]/ weight of sample before drying

APPENDIX X

AOAOC METHOD OF ASH CONTENT ANALYSIS

Ash content analysis:

- Dry ashing procedures use a high temperature muffle furnace capable of maintaining temperatures of between 500 and 600 ºC.
- Water and other volatile materials are vaporized and organic substances are burned in the presence of the oxygen in air to CO_2, H_2O and N_2.
- Most minerals are converted to oxides, sulfates, phosphates, chlorides or silicates.
- Although most minerals have fairly low volatility at these high temperatures, some are volatile and may be partially lost, *e.g.,* iron, lead and mercury.
- If an analysis is being carried out to determine the concentration of one of these substances then it is advisable to use an alternative ashing method that uses lower temperatures. (AOAC, 2012)
- The food sample is weighed before and after ashing to determine the concentration of ash present. The ash content can be expressed:

$$\%\text{ Ash (dry basis)} = \frac{M_{ASH}}{M_{DRY}} \times 100$$