CHAPTER 31

HOME SCIENCE

Doctoral Theses

01. ANWAR (Wareesha)

Predictors of Successful Weight Loss Outcomes Amongst Young Adults with Overweight and Obesity Undergoing Weight Loss Intervention at a Tertiarycare Hospital.

Supervisors: Prof (Dr.) Manisha Sabharwal, Prof (Dr.) Anita Malhotra and Prof (Dr.) Piyush Ranjan

Th 29397

Abstract

Obesity among young adults is an emerging public health concern in India. This life stage involves academic pressures, employment transitions, changing social roles, marriage, and evolving lifestyle patterns that influence diet, physical activity, sleep, and engagement with health programmes. Consequently, obesity in this group is linked to early metabolic risk, psychosocial challenges, and poor long-term adherence to weight-management services. However, evidence from low- and middle-income settings on sustained weight loss, behavioural determinants, and attrition patterns in young adults remains limited. Objectives: To identify predictors of clinically significant weight loss among young adults participating in a structured lifestyle intervention. Secondary objectives were to describe anthropometric, biochemical, and lifestyle characteristics; assess attrition and its predictors; and examine perceived barriers to weight management. Methods: A prospective cohort study was conducted among 304 young adults (18–30 years) with overweight or obesity attending a tertiary care centre in Northern India. Baseline assessment included socio-demographic characteristics, anthropometry, body composition, biochemical parameters, dietary intake, physical activity, lifestyle behaviours, and perceived barriers. Participants received a structured lifestyle intervention including behavioural counselling, personalised dietary planning, physical-activity prescription, and barrier-focused problem-solving. Participants were followed for six months. Endline data were available for 225 participants, while 79 were lost to follow-up. Clinically significant weight loss was defined as ≥5% reduction from baseline body weight. Regression models were used to identify predictors of weight loss and attrition. Results: Among completers, 43.1% achieved ≥5% weight loss, 34.7% achieved <5% weight loss, and 22.2% gained weight. Mean weight change was −3.16 ± 4.56 kg (−4.02 ± 6.13%). Successful participants showed greater reductions in weight, BMI, waist circumference, and body fat ($p<0.001$), with improvements in triglycerides and hepatic steatosis indicators. They also demonstrated greater reductions in energy and carbohydrate intake and increased moderate-intensity physical activity. Higher baseline body weight and greater fruit and vegetable intake predicted weight loss, whereas short sleep duration (<6 h) predicted poorer outcomes. Attrition (25.9%) was mainly related to life-stage events such as examinations, marriage, pregnancy, and loss of interest. Conclusion: A six-month lifestyle intervention can achieve meaningful weight loss among young adults. However, sustained success depends on addressing behavioural and contextual barriers.

Flexible, developmentally appropriate programmes that integrate behavioural support and adaptive follow-up strategies may improve retention and long-term outcomes.

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02 BARKHA

Immediate Food Environment and its Association with Diet Quality and Health Status of Women Living in Delhi.

Supervisors: Dr. Bani Tamber Aeri and Dr. Seema Puri

Th 29398

Abstract

A cross sectional study was conducted among 400 women from different socio-economic settings of Delhi to assess the personal and external (physical and digital) domains of their food environment and also to identify its influence on the diet quality and health status of the women. The mean age of the women was 36.50±7.17 years. There was a high prevalence of obesity (70%). Women met the recommendations of energy and protein intake, while intake of carbohydrate exceeded recommendations. Percent contribution of fat to total energy exceeded the recommended amount particularly among Middle Income Group (MIG) women. Only 38% women had adequate diet diversity. More MIG women (60%) purchased grocery online than LIG (15%) ($p<0.001$). Women of both income groups perceived an easy to moderate access to all kinds of food shops. A higher proportion of LIG women (75%) perceived healthy foods as expensive. Maximum women cooked food daily (MIG-88%, LIG- 92.50%). While purchasing food items, price was the influential factor for LIG women (85%) while MIG mentioned freshness (60%). There was an unfavorable digital food environment, in terms of availability of unbranded, low-cost food items alongside aggressive marketing on the grocery app commonly used by LIG women. Neighbourhood food environment indicated a greater number of unhealthy food outlets and display of images of unhealthy food items/beverage in all shops of both areas. Higher obesity rates were significantly associated with the increase in number of unhealthy food outlets in neighbourhood ($p=0.001$); poor accessibility to fruits and vegetable shops ($p=0.001$) and also, with low perceived affordability. An increase in age ($p=0.012$), education levels ($p<0.01$); low energy ($p=0.023$), high protein ($p=0.019$) and MUFA intake ($p=0.069$) were significantly associated with diet diversity. Disseminating nutritional knowledge, limiting availability of unhealthy foods, regulating marketing on grocery apps are requisite for creating a healthier food environment in Delhi.

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03 KAUR (Naman)

Development and Optimisation of a Plant-based, Iron-rich Fortifier Using Underutilised, Traditional, Iron-rich Food Sources.

Supervisor: Prof. (Dr.) Manisha Sabharwal

Th 29399

Abstract

Iron deficiency anaemia (IDA) remains a significant public health concern worldwide, especially in India, due to suboptimal dietary patterns. This study aimed to develop and optimise a plant-based iron-rich fortifier (PBIRF) using traditional, underutilised, iron-rich foods – amaranth grains (AG), Moringa oleifera leaves (MOL), and garden cress seeds (GCS) – to sustainably and affordably improve iron intake. The research was conducted in three phases. Phase I involved a web-based cross-sectional survey assessing dietary and snacking behaviours among urban Indian adults. Although shifts towards healthier diets were reported, unhealthy practices, including meal skipping and non-hunger-driven snacking and preference for deep-fried snacks, persisted. Significant gaps were observed in knowledge of iron-rich foods, anaemia symptoms, and the role of vitamin C in iron absorption. Based on pilot trials from Phase I, biscuits were selected as the snack vehicle for PBIRF optimisation. Phase II optimisation used MOL powder (MOLP) and GCS powder (GCSP) as independent variables, with AG flour (AGF) and refined flour held constant. The biscuit formulations developed through response surface methodology exhibited iron levels between 10.2 □ 1.2 mg/100g and 12.6 □□1.5 mg/100g, with flavour and overall acceptability scores between 6.7 □ 0. 1 and 7. 8 □□0.2, and 6.3 □ 0.2 to 7.8 □□0.1, respectively. The optimal formulation containing 12% MOLP and 7.5% GCSP achieved a high desirability score (0.811). Increasing MOLP and GCSP enhanced iron content and acceptability, despite negatively influencing flavour. The optimised PBIRF demonstrated superior nutrient content, 45-day storage stability within FSSAI moisture limits, and minimal toxicity in Caco-2 cell assays at elevated concentrations. Phase III showed that optimised PBIRF improved nutritional, sensory and functional quality of fortified snacks while preserving iron bioavailability, costing ~ ₹52/100g, and providing 40-80% of iron RDA for various physiological groups. Overall, findings indicate that PBIRF from underutilised plant-based iron sources offers a sustainable, affordable, and scalable fortification approach to combat IDA.

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04. PATHAK (Vaishali)
Association of Diet and Lifestyle Factors with Physical and Mental Well-Being of Working Adults of Delhi NCR & Bengaluru.
Supervisor: Dr. Bani Tamber Aeri
Th 29400

Abstract

The current study was conducted on private-sector employees from Delhi NCR (n=193) and Bengaluru (n=197) to understand lifestyle practices and how these impact their physical and mental health. A majority subjects (75.67%) were obese, 62.31% had high waist circumference, 67.44% had high waist-to-Height Ratio, and 43.59% had higher body fat. HbA1c levels indicated that 23.59% were prediabetic and 7.18% were diabetic. A higher incidence of undiagnosed diabetes was observed. Hypercholesterolemia (38.21%), hypertriglyceridemia (45.36%), elevated LDL (71.54%), and low-HDL (49.75%) were also observed. The prevalence of dyslipidemia was 80.77%, while that of hypertension was 19.48%. Metabolic Syndrome was observed in 40.51% subjects. A majority of subjects (51.79%) had inadequate physical activity, while 39.49% had poor sleep quality. As per the standardised tools,

22.30% subjects had scores indicating major depressive disorder, 20% indicating generalized anxiety disorder, and 44.10% had moderate-high work stress. Less than 50% Delhi subjects met the Estimated Average Requirements (EAR) for all minerals (except sodium) and B-vitamins, while <50% Bengaluru subjects met the EAR for all minerals (except sodium), B-vitamins, retinol and ascorbic acid. Sodium intake was higher than the recommendations for 89.74% subjects. Findings of the Global Dietary Recommendation score reported that a majority of subjects included fewer protective foods over the weekend than weekday ($p<0.001$). Age, lifestyle practices (smoking, alcohol intake, poor sleep and dietary practices) and work-related factors (higher commute to work, etc.) were associated with increased cardiometabolic parameters and MetS ($p<0.05$). Female sex (vs male) played a protective role against these parameters ($p<0.05$). Females had significantly higher odds of having poor mental health ($p<0.05$). Work-related factors like income, work shift, etc. and poor sleep increased the odds of having poor mental health ($p<0.05$). Findings of the current study highlight the need for lifestyle modification and regular health check-ups to promote good health of working adults.

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05. ROHATGI (Shivani)
Assessment of Nutrition and Health Status of Severely Acute Malnourished Children (12-<60 months) Managed Through Nutrition Rehabilitation Centre of Delhi: A Follow-up Study.
Supervisors: Prof. (Dr.) Sukhneet Suri and Dr. Praveen Kumar.
Th 29111

Abstract

Globally, severe acute malnutrition (SAM) represents a serious public health issue. Detailed and precise nutritional assessment of SAM children such as through a combination of anthropometry and bioelectrical impedance analysis during various stages of treatment and rehabilitation can be useful in targeting early recovery, prevention of comorbidities, death as well as reducing risk of future occurrence of non-communicable diseases. This observational longitudinal study aimed to assess the nutrition and health status of SAM children (≥12 to <60 months) managed through nutrition rehabilitation centre. Enrolment was on basis of inclusion-exclusion criteria. Nutrition and health status was assessed by anthropometry, oedema status, six biochemical indicators, body composition (fat-mass; FM, fat free mass; FFM etc.), dietary intake, and the knowledge attitude practices of mothers. The data was gathered at admission, discharge and at the five-post discharge follow ups. 119 SAM girls and boys completed the study. Significant improvements ($p<0.001$) were observed in mean weight-for-age, weight-for-height, Mid-upper-arm-circumference, skin fold thickness. Reduction in severe wasting and BMIZ deficit was 40.2 per cent, and 46.2 per cent respectively. The mean FM, FFM, fat-mass-index and fat-free-mass-index increased significantly ($p<0.001$). Reduction in the prevalence of anemia was 14.6 per cent. There was significant improvement in several biochemical parameters and dietary intake ($p < 0.05$). As per the WHO (2023) criteria of recovery, at the end of the study period, 33.6 per cent children were cured (recovered). BIA was found to estimate higher BF% and FM compared to skinfold measurements, while both methods yielded comparable FFM estimates. Longitudinal nutritional assessment of SAM children (cured/ not cured) such as through body

composition improves understanding of physiological recovery by distinguishing the nature of tissue accretion. It should therefore be incorporated into public health services to improve recovery outcomes and provide long term health benefits.

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06. SANA AHMED

Influence of Low Birth Weight at Term on the Insulin Sensitivity and ß-Cell Function in Children Aged 10-15 Years.

Supervisors: Prof. Eram S. Rao and Prof. Geeta Trilok-Kumar.

Th 29401

Abstract

Type 2 diabetes (T2D), the most common form of diabetes worldwide, arises from insulin resistance and progressive β-cell dysfunction. It affects millions, burdening healthcare systems and economies with India facing particularly high prevalence. While obesity, physical inactivity, and poor diet are established risk factors, the Developmental Origins of Health and Disease (DOHaD) hypothesis highlights intra-uterine and early childhood exposures as critical determinants. Studies show that low birth weight (LBW) children are more likely to develop T2D, cardiovascular disease, and hypertension later in life. This study compared pancreatic function, anthropometry, and diet in LBW (<2.5 kg) and normal birth weight (NBW, 2.5-4 kg) children from underprivileged Delhi NCR areas, originally enrolled in the Delhi Infant Vitamin D Supplementation study (DIVIDS). At follow-up (ages 10-15 years), 264 LBW and 58 NBW participants were traced. Data collection included socio-demographical information, anthropometric measurements, estimation of pancreatic endocrine function (oral glucose tolerance tests (OGTT) measuring glucose, insulin, and C-peptide and HbA1c at baseline), pancreatic exocrine function (fecal elastase and serum lipase) and dietary assessment. Indices of insulin sensitivity and secretion were derived from OGTT measures. LBW children were older (LBW,13.9 years; NBW, 11.9 years) and had significantly lower weight, height, BMI, and height-for-age Z-scores. They showed impaired insulin sensitivity (lower Matsuda Index) but compensatory hyperinsulinemia (higher IGI). Obese LBW participants exhibited reduced insulin sensitivity and reduced β-cell function compared to obese NBW peers. Exocrine function was largely normal, though LBW children had higher elastase insufficiency. Dietary analysis revealed lower intake of roots, tubers, and fats among LBW children, with widespread micronutrient inadequacies across both groups. Higher adherence to fruit and animal-protein dietary patterns was associated with elevated HbA1c and 2-hr glucose. Findings suggest LBW children already display early metabolic changes, especially with obesity. Early identification, monitoring, and lifestyle interventions are essential. Larger longitudinal studies are needed to confirm these associations.

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07. VASUNDHRA CHANDS

Assessment of Nutritional Status and Risk Factors for Non-Communicable Diseases among Adult Population of Delhi.

Supervisors: Prof. (Dr.) Neena Bhatia and Prof. (Dr.) G.S. Toteja.

Th 29347

Abstract

Non-communicable diseases (NCDs) are witnessing a rising global burden and are a major public health concern worldwide due to urbanization, lifestyle changes, and physical inactivity. This study assessed nutritional status and risk factors for NCDs among adults in Delhi. Data were collected using a pretested semi-structured questionnaire covering socio-demographic characteristics, behavioural risk factors, nutritional status, and dietary patterns. Anthropometric measurements, behavioural assessments and blood pressure measurements were taken for all participants. Dietary intake using a 24-hour dietary recall and Food Frequency Questionnaire as well as biochemical parameters were assessed in a subsample. Data were analysed using SPSS version 25. The study showed 86.2% of participants having at least one risk factor. Physical inactivity was the most common behavioural risk factor (57.4%), followed by tobacco use (22.2%) and use of alcohol (15.8%). Abdominal obesity (45.3%) exceeded overweight (40.2%), while hypertension was prevalent in 12.2% of participants. Socioeconomic differences were evident, with middle-income group adults showed higher prevalence of overweight (53.5%), abdominal obesity (62.3%), and hypertension (15.8%), while tobacco use was higher among urban slum residents (33.9%). Males had higher tobacco use (34.4%) and alcohol use (30.3%), whereas females had higher physical inactivity (59.1%), overweight (45.0%), and abdominal obesity (54.6%). Dietary intake was largely inadequate, with micronutrient deficiencies (calcium, zinc, B-vitamins, vitamin A) across all groups, while fat intake exceeded recommended levels in the MIG group (>100%). Inadequate dietary diversity was observed in 65.6% of adults, and high-fat, sugar and salt food consumption was higher among middle-income groups (72.6%). Clustering of NCD risk factors was significantly associated with age, middle-income group, male gender, and lower educational level. Overall, the findings highlight the need for targeted lifestyle modification and implementation strategies for NCD prevention. Keywords: Non-Communicable Diseases, Nutritional status, Dietary patterns, Behavioural risk factors, Socioeconomic groups, Adults, Delhi.

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