

Guided Poster Presentation 1

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GPP 1-1 1. Behavior and Public Health for Obesity

The potential role of exercise in osteocalcin-elicited memory improvement in HFHSD-induced obese mice

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Background: Obesity is a precipitating factor for developing memory dysfunction. Osteocalcin (OCN) is a dispensable molecule for osteoblast activity and bone formation. Recent studies suggest that bone-derived OCN is able to be across the blood brain barrier (BBB), and modulate cognitive function. There's been a growing interest in high-intensity interval training (HIIT) as a potential time-effective alternative modality to conventional aerobic exercise. This work showed the beneficial role of exercise-exerted OCN within dentate gyrus (DG) in obesity mouse model and its underlying mechanism.

Methods: Mice were fed with the high fat and high sucrose diet (HFHSD) for 12 weeks. Mice were subjected to the HIIT for 8 weeks. For measuring spatial memory capacity, the Modified Y-maze test was performed 1 day after the last exercise regimen. To explore the potential role of BBB-permeable OCN in obese-induced memory deficits and its related mechanism, molecular changes were assessed by the immunofluorescence approaches.

Results: HFHS-fed increase in body weight gain was attenuated by the exercise intervention. In Y-maze test, obese-induced decrease in the entry

and time spent in novel arm was reversed by exercise intervention. In neurogenic activity, obese-induced decline of Ki-67+ and doublecortin+ cells were reversely increased by exercise intervention, in which exercise itself enhanced neurogenic capacity. BDNF expression in DG area corresponded well to neurogenic activity. OCN immunoreactivities profoundly raised by exercise regardless of the HFHS diet in the hilus area. Co-localized GRP158+ with OCN+ particle area increased regardless of HFHS diet in the hilus area. In particular, GRP158+ particles were predominantly detected in GFAP+ cells, and exercise intervention enhanced GRP158 expression regardless of HFHS diet. Moreover, OCN activated AKT/GSK3 β signal cascade in the hilus area. Based on our data, exercise intervention improved obese-induced body weight gain and spatial memory impairment via the delivery of bone-derived OCN across the BBB, thereby enhancing the neurogenic capacity through the brain-derived neurotrophic factor expression in astrocyte and its enhanced release into the DG area.

Conclusion: In conclusion, HIIT may a promising strategy to be able to elevate the brain OCN for improving HFHSD-induced decline of memory function.

GPP 1-2 1. Behavior and Public Health for Obesity

Associated factors for Metabolically Unhealthy Obesity and its relation to Food Insecurity in Korean adults with obesity

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Background: Food insecurity has been associated with obesity in previous studies; however, the association between food insecurity and metabolically unhealthy obesity (MUO) in obese population is unclear. In this study, we evaluated associated factors for MUO in adults with obesity and investigated the relationship between food insecurity and MUO.

Methods: We analyzed 5,191 adults with obesity (BMI ≥ 25 kg/m²) in the 8th Korea National Health and Nutrition Examination Survey 2019–2021. MUO was defined when participants with obesity had any of the followings: 1) triglyceride ≥ 150 mg/dL, 2) HDL-cholesterol < 40 mg/dL (men), < 50 mg/dL (women), 3) SBP ≥ 135 mmHg or DBP ≥ 85 mmHg or on treatment for hypertension, 4) fasting glucose ≥ 100 mg/dL or on treatment for diabetes. The ORs and 95% CIs for MUO according to food security status, sociodemographic characteristics, and lifestyle factors were calculated by multivariate logistic regression analysis.

Results: Of the 5,191 participants with obesity, the prevalence of MUO and metabolically health obesity (MHO) was 85.4% and 14.6%, respectively. In the multivariate model, the OR (95% CIs) for MUO in food insecurity group was 1.87 (1.03–3.43) compared to food secure group. The odds for MUO were higher among participants with older age, higher BMI, < 12 years of education, and lower fat intake compared to their counterparts. The odds were also higher among non-manual workers, those with moderate and low physical activity compared to those without occupation and those with high physical activity.

Conclusion: Food insecurity, as well as, older age, higher BMI, lower educational level, lower fat intake, being non-manual workers, and lower physical activity were associated with MUO. Improving food insecurity and public health strategies targeting these populations are needed to prevent cardiometabolic disorders entailed to obesity.

GPP 1-3 5. Diabetes and Obesity

Modelling Outcomes of Tirzepatide Versus Lifestyle Modification for Overweight and Obesity

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Background: Tirzepatide showed up to 22.5% of weight reduction and improvement in cardiometabolic risk factors in SURMOUNT-1 study. This study estimated clinical outcomes over 10 and 15 years with tirzepatide compared to lifestyle modification (LSM) using a patient-level simulation (PLS).

Methods: A PLS was implemented in the discretely-integrated condition-event framework, which considers patient heterogeneity and event history. Baseline patient characteristics were derived from NHANES data filtered to match FDA criteria for anti-obesity medications, excluding people with type 2 diabetes (T2D). The model used data from the SURMOUNT-1 study to simulate the impact of tirzepatide and LSM on BMI. Simulated metabolic factor (i.e., BMI, HDL, SBP, and fasting plasma glucose) trajectories were inputs to published risk equations that estimate risk of key obesity-related complications, including cardiovascular events (Framingham 10-year risk estimate) and onset of T2D (Framingham Offspring study). Health-related quality of life was linked to BMI and complications over time.

Results: The model estimated tirzepatide 15 mg reduced the percentage of patients developing T2D by 24.8% and 17.5% versus LSM, and delayed time to onset of T2D by 0.89 and 1.95 years, over a 10-year and 15-year time horizon, respectively. Rates of renal disease at 10-years were 6.5% lower and at 15-years were 7.8% lower for tirzepatide 15 mg versus LSM. The percentage of patients developing any cardiovascular event was 2.5% and 1.5% lower for tirzepatide 15 mg versus LSM at 10years and 15years, respectively. The rate of cardiovascular death was 1.1% lower for tirzepatide 15 mg versus LSM at both time points.

Conclusion: Ten- and fifteen-year estimated projections using a validated model showed people with obesity or overweight treated with tirzepatide were projected to have decreased incidence of obesity-related complications.

GPP 1-4 2. Nutrition, Education and Exercise for Obesity

Maternal Biochemical indicators and their correlation with Foetal Birth weight, India.

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Background: Birth weight is a crucial parameter in assessing neonatal health and predicting lifelong health outcomes. Low birth weight (LBW) and high birth weight, or macrosomia, represent two ends of the birth weight spectrum, each carrying distinct health implications for individuals across the life course. 1 in 7 newborns are affected by Low birth weight. (UNICEF-WHO Low birth weight estimates, 2023). This study aims to investigate the relationship between various maternal biochemical markers and fetal birth weight, highlighting key factors that could predict and potentially modulate birth outcomes.

Methods: The present study is a pregnancy follow-up study conducted among 249 pregnant women in Delhi, India. Biochemical investigations (plasma homocysteine, folate, and vitamin B12 levels) were performed on all pregnant women in first & third trimester and infant birth weight were recorded. Statistical analysis was performed to understand the effect of selected maternal biomarkers on foetal birth weight.

Results: The study revealed that the prevalence of Low Birth Weight babies was significantly higher in the group with similar levels of folate during first trimester and during delivery assessment, compared to those with reduced or increased levels of folate at the time of delivery ($p=0.013$). During the 1st trimester homocysteine was found to be associated with number of foetal complications.

Conclusion: The study found a significantly higher prevalence of low birth weight (LBW) infants in mothers who maintained similar levels of folate throughout the first trimester and at delivery, compared to those whose folate levels either decreased or increased by delivery ($p=0.013$). Additionally, elevated homocysteine levels during the first trimester were associated with a higher number of fetal complications, indicating the importance of monitoring and managing these biochemical markers during pregnancy to improve neonatal outcomes.

GPP 1-5 11. Obesity and Metabolic Syndrome in Children and Adolescents

Association Between Muscular and Cardiorespiratory Fitness with Body Composition, Blood Pressure, and Leptin in Children and Adolescents with Obesity

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Background: The prevalence of pediatric obesity is increasing. Physical fitness has been known to be associated with the risk of cardiometabolic diseases. This study aims to examine the associations of muscular and cardiorespiratory fitness with body composition and cardiometabolic markers in children and adolescents with obesity.

Methods: Data from 198 participants (age: 11.03 ± 1.44 years, BMI: $27.56 \pm 3.25 \text{ kg/m}^2$) of ICAAN study, an intervention study for children and adolescents with obesity, were analyzed. Heart rate recovery (HRrec) was evaluated by measuring the heart rate change 1-minute post-exercise using the YMCA step test. Muscle strength index (MSI) was calculated by dividing the sum of the 1-RM for the chest press and leg extension by body weight. Body composition was evaluated using whole-body dual-energy X-ray absorptiometry. The proton density fat fraction estimated by magnetic resonance imaging was used to quantify hepatic fat. Venous blood samples were obtained after a 10-h overnight fast for metabolic variables. Participants were stratified into three groups based on tertiles of MSI (TM1, TM2, TM3) and HRrec (TH1, TH2, TH3). Data analysis was performed using one-way analysis of variance and analysis of covariance.

Results: The group with the highest tertile of HRrec (TH3) showed

significantly lower systolic blood pressure (SBP, 118.74 ± 9.29 vs 125.83 ± 13.23 , $p = .001$), diastolic blood pressure (DBP, 64.35 ± 10.15 vs 69.02 ± 9.31 , $p = .010$), insulin (13.28 ± 5.88 vs 17.70 ± 9.06 , $p = .018$), and HOMA-IR (3.00 ± 1.38 vs 4.25 ± 3.16 , $p = .015$) compared to the lowest tertile of HRrec (TH1). The TM3 group exhibited significantly lower fat mass index (FMI, 9.98 ± 2.20 vs 11.31 ± 2.35 , $p = .003$), percent body fat (%BF, 36.16 ± 5.16 vs 41.17 ± 4.29 , $p < .001$), hepatic fat (11.27 ± 8.90 vs 15.53 ± 11.18 , $p = .040$), and leptin (28.48 ± 11.76 vs 37.96 ± 15.63 , $p < .001$) compared to the TM1 group while showing significantly higher fat free mass index (FFMI, 17.56 ± 2.06 vs 15.95 ± 1.23 , $p < .001$). After adjusting for age, sex, and BMI Z score, The TH3 group showed significantly lower SBP (Mean (SE); $116.75 (1.59)$ vs $125.17 (1.28)$, $p = .000$), DBP ($64.10 (1.39)$ vs $68.88 (1.11)$, $p = .025$) compared to the TH1 group. The TM3 demonstrated significantly lower FMI ($10.28 (0.17)$ vs $11.22 (0.14)$, $p = .000$), %BF ($37.08 (0.54)$ vs $40.74 (0.45)$, $p = .000$) and leptin ($31.52 (1.91)$ vs $38.48 (1.59)$, $p = .018$), along with increased FFMI ($17.25 (0.16)$ vs $16.11 (0.13)$, $p = .000$) compared to TM1.

Conclusion: The findings indicate that muscular and cardiorespiratory fitness could serve as significant parameters for assessing body composition and cardiometabolic health in pediatric obesity.

GPP 1-6 3. Epidemiology of Obesity and Metabolic Syndrome

Comparison of Time Restricted Feeding and Continuous Energy Restriction on Body Composition and Multiple Metabolic Parameters in Obese Indian Adults

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Background: Time-restricted feeding (TRF) is a novel dietary tool that recommends individuals to shorten the duration of the daily eating window, without altering calorie intake or diet quality. It proposes a solution to restraining the feeding window from 4 to 12 hours per day, aligning it with circadian rhythms. TRF enhances metabolic health and promotes weight loss without altering calorie intake in obese adults. This study aims to assess the effect of TRF compared to Continuous Energy Restriction (CER) in addressing body composition, multiple metabolic measures, sleep quality and quality of life in obese adults.

Methods: This prospective randomized controlled trial was carried out at AIIMS, Delhi. 120 subjects aged between 18-60 years fulfilling the inclusion criteria were randomly assigned in one of the three groups, TRF (10:14) (n=40), TRF (12:12) (n=40) or CER (n=40) for a 12-weeks period. Subjects were advised to follow TRF (10:14), TRF (12:12) or CER diet and to practice 150 minutes of moderate intensity physical activity throughout the week. The assessment included anthropometric, biochemical, body composition, sleep quality (Pittsburgh Sleep Quality Index Questionnaire) and quality of life (Short Form-36 Questionnaire) analysis at baseline, 6 weeks and at 12 weeks.

Results: Significant improvements post-intervention was observed in TRF (12:12) group in anthropometrics, body fat %, blood glucose, lipid profile, sleep quality and quality of life. The mean age was comparable in all the groups [TRF (12:12) 44 ± 5.2 y, TRF (12:12) 43 ± 5.5 y and CER 44 ± 4.6) and 60% were females. At the end of intervention, weight loss of 8.36% was observed in the TRF (12:12) against of 6.82% in TRF (10:14) and 3.2% in the control group ($p < 0.05$). A significant reduction in waist hip ratio (-3.9%, $p < 0.05$), body fat % (-24.66%, $p < 0.05$), total cholesterol (-7.29%, $p < 0.05$) and triglycerides (-6.3%, $p < 0.05$) were observed in the TRF (12:12) as compared to TRF (10:14) and CER group. TRF (12:12) was found to be beneficial in significant improvement of sleep quality and quality of life among the obese subjects, demonstrating potential health benefits.

Conclusion: This study found that TRF (12:12) was more beneficial and a suitable alternative for managing obesity and promoting health with no side effects compared to TRF (10:14) and CER.