

# Poster Exhibition

## 4. Digital Therapeutics and Big Data Study

PE 04-01 4. Digital Therapeutics and Big Data Study

## The Impact of Wearable Technology and Geo-Fencing Devices on Physiological Data Management and Quality of Life in Adolescents with Type 2 Diabetes and Obesity

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**Methods:** A cohort of 1050 obese adolescent patients with type 2 diabetes, evenly distributed across genders, wore the wearable monitoring devices and geo-fencing devices for 30 days, alongside completing a questionnaire to provide additional insights. Daily monitoring of blood pressure, blood glucose levels, step count, calorie expenditure, motion time, sleep patterns, calorie consumption, and heart rate will be recorded for analysis. The wearable bands will issue alert cues with sensing alerts if patients move out of the geo-fenced area, persisting until they return within the designated boundary.

**Results:** Preliminary findings reveal a notable normalization of heart rate ( $p < 0.05$ ), increased calorie expenditure, significant reductions in blood

glucose and blood pressure levels ( $p < 0.01$ ), and a substantial increase in sleep duration among physically active obese patients with type 2 diabetes compared to their less active counterparts, as assessed by professional physiotherapists. Furthermore, lifestyle modifications among less physically active patients resulted in improved memory and reduced instances of wandering, necessitating lower medication doses.

**Conclusions:** In conclusion, this study underscores the potential of wearable devices to provide real-time assistive feedback to obese adolescents with type 2 diabetes, thereby fostering health awareness, promoting exercise, and inspiring further research endeavors

PE 04-02 4. Digital Therapeutics and Big Data Study

## Effectiveness of Mobile Health in Improving Gestational Weight Gain among Pregnancy Women in Malaysia

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**Background:** Conventional nutrition education is often inadequate, especially in socially unequal societies, leading to disparities in maternal health. This 6-month cluster randomized controlled trial examined the use of mobile health (mHealth) applications as a more accessible and personalized nutrition education approach on gestational weight gain (GWG) among pregnant mothers.

**Methods:** This study evaluated the effectiveness of the "Ibu Sihat" smartphone application in delivering nutritional interventions to improve pregnancy outcome (GWG) among pregnant women. The study randomized 290 pregnant women into three groups: control (conventional nutrition counselling,  $n=98$ ), intervention group 1 (IG1, mHealth alone,  $n=97$ ), and intervention group 2 (IG2, mHealth with personalized Medical Nutrition Therapy, MNT,  $n=95$ ). Respondents' body weights were measured at baseline, 3 months (T1) and 6 months (T2) and weekly GWG of the respondents were calculated.

**Results:** Mean pre-pregnancy weight of the respondents was  $60.0 \pm 13.6$  kg. Over 30% of the respondents were overweight or obese. At baseline, more than 87% of the respondents did not meet the recommended weekly GWG. There was no significant difference on weekly GWG between groups. At T1, IG2 had the highest percentage of the respondent (48.4%) achieving the recommended GWG. Similar scenario was observed at T2, with approximately two-thirds of the respondents achieved recommendation of GWG. Notably, none of the respondents in IG2 experienced excessive GWG at T2. There was no significant difference between control and IG1 groups on the achievement of recommended GWG.

**Conclusion:** The study highlights that inappropriate GWG was prevalent among pregnant mothers in Malaysia. Conventional nutrition education is insufficient in addressing disparities in maternal health, particularly regarding GWG. Together with personalised MNT, mHealth applications demonstrated its potential as an effective tool in reducing excessive GWG among pregnant women.

PE 04-03 4. Digital Therapeutics and Big Data Study

## The Prevalence of Eating Jet Lag and Its Associated Factors among Malaysian Adults: A Nationwide, Online Web-Based Cross-Sectional Survey

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**Background:** Eating jet lag (EJL) has been reported associated with irregular mealtime and BMI respectively among Japanese male college students and Spanish university students, in contrast, no association reported of EJL with physical activity, eating duration window, sleep duration and chronotype. Health status such as glucose and adiposity level positively associated with higher SJL among Type 2 Diabetes Mellitus patients in India. Although previous studies reported association of EJL with various related factors, there are inconsistency of findings which lead to the importance of exploring EJL and its associated factors among Malaysian adults, in addition of determining the eating jet lag prevalence among Malaysian adults population.

**Methods:** A total of 2650 Malaysian adults (18 – 59 years old) responded to a web-based cross-sectional survey with the final sample comprised of 2451 participants (mean age 33 ± 1.59 years). EJL (the difference in midpoint of eating between workdays and free days) categorized as <1 hour and ≥1 hour. The chi-square test was utilized to test for significant associations between EJL groups with sociodemographic factors, selected health status, eating behaviors and social jet lag.

**Results:** The mean value of EJL was 1.05 (1.11) hours with prevalence of EJL ≥1hr among 1949 participants was 45.8%. Participants with EJL ≥1hr significantly younger, 31.6 (8.4) years, than EJL <1hr, 33.9 (8.8) years, also had significant difference among gender and ethnic distribution. However, there were no significant difference in the presence of selected health status such as BMI, tobacco and alcohol consumption and non-communicable disease (NCD) between EJL groups. Participants with higher EJL significantly more likely to has shorter eating duration window during workdays and free days with the mean 12:01 (2:41) hours and 9:56 (3:36) hours respectively together with significant mealtime variability (p<.001) for Breakfast, Morning Tea, Lunch, Dinner and Supper between workdays and free days. SJL, insomnia and daytime sleepiness also associated with EJL groups.

**Conclusion:** EJL associated with sociodemographic factors, shorter mealtime variability, higher SJL and sleep habits such as presence of insomnia and fatigue. Further analysis should be administrated to explore the predictors of EJL among Malaysian adults.

PE 04-04 3. Epidemiology of Obesity and Metabolic Syndrome

## Usage of a Mobile Food Diary Program among Liposuction and Non-Surgical Patients

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**Background:** Mobile food diary programs have become increasingly popular for tracking dietary intake. It's not well understood how much dieters use mobile food diaries. This study aims to analyze the usage patterns of a mobile food diary program among new customers of obesity clinic.

**Methods:** We analyzed data from 18,212 new customers who registered between January and November 2022. The usage of the mobile food diary program was tracked for each customer, and the percentage of customers who used the program at least once was calculated. Additionally, we examined the usage patterns among liposuction customers and non-surgery customers.

**Results:** Among the 18,212 new customers, 1,734 (9.52%) used the mobile food diary program at least once. The usage percentage was similar between surgery customers (9.72%) and non-surgery customers (9.4%). The number of diary entries increased over time since registration,

peaking around 50 days post-registration for liposuction customers and 30 days for non-surgery customers, before declining. The difference in the duration of the mobile food diary is likely due to the difference in the duration of the follow up. Liposuction customers typically have a longer follow-up period compared to non-surgery customers, which may contribute to their longer engagement with the mobile food diary program. Additionally, the decline in usage after the peak suggests that customers may lose motivation or interest in using the program over time, regardless of the type of treatment they received.

**Conclusion:** The majority of new customers did not use the mobile food diary program, highlighting the need for strategies to encourage initial usage. Moreover, usage tended to decline after the peak, suggesting the importance of maintaining customer engagement. Implementing incentives for first-time use and developing features to promote long-term participation could potentially improve the utilization of the mobile food diary program.

PE 04-05 4. Digital Therapeutics and Big Data Study

## Comparing Cardiovascular Outcomes in Diabetes: Initial Statin Monotherapy vs. Statin Plus Ezetimibe Combination with Consideration of Baseline Metabolic Status

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**Background:** Some studies have shown that combining statins with ezetimibe reduces low-density lipoprotein (LDL) cholesterol more effectively than higher-intensity statin monotherapy. Statins may induce insulin resistance, affecting their long-term efficacy in preventing cardiovascular events. Due to limited data on these therapies, we evaluated the long-term effects of statin-ezetimibe combination therapy versus statin monotherapy on major cardiovascular outcomes.

**Methods:** This population-based cohort study used National Health Insurance Service data on South Korean adults without prior anti-dyslipidemic medication use before 2010. Patients on statin monotherapy were 1:1 propensity score-matched with those on a lower-potency statin and ezetimibe combination therapy. The primary endpoints were 3-point major adverse cardiovascular events (3P-MACE): myocardial infarction, stroke, and cardiovascular disease (CVD).

**Results:** The study included 21,458 individuals in the primary prevention cohort and 10,094 in the secondary prevention cohort. Statin and ezetimibe combination therapy significantly reduced the incidence of the primary endpoint (4.85 vs. 3.25 per 1,000 person-years; HR 0.67, 95% CI 0.56–0.81 in the primary cohort, and 19.5 vs. 15.7 per 1,000 person-years; HR 0.80, 95% CI 0.70–0.91 in the secondary cohort) compared to statin monotherapy. Notably, the effects on reducing 3P-MACE were more efficient in patients with high body mass index and uncontrolled systolic blood pressure in patients without previous CVD.

**Conclusion:** This cohort study demonstrates that initiating statin-ezetimibe therapy reduces cardiovascular events in patients compared to statin monotherapy.

PE 04-06 3. Epidemiology of Obesity and Metabolic Syndrome

## Designing a Social Media Intervention Framework to Reduce Consumption of High Energy-Dense Foods and Sugar-Sweetened Beverages Among Adolescents

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**Background:** In Malaysia, one in three adolescents is overweight or obese, with significant consumption of carbonated beverages and fast food. Social media significantly exposes adolescents to high energy-dense (HED) foods and sugar-sweetened beverages (SSBs). With adolescents' widespread smartphone and social media use, digital platforms are crucial for nutrition interventions. However, studies show low engagement and marginal results. Therefore, this study aimed to develop a theoretically grounded framework for a social media intervention to limit HED foods and SSBs consumption among adolescents.

**Methods:** This qualitative study consists of three phases: 1) Needs analysis through a systematic literature review and in-depth interviews with 15 adolescents; 2) Design and development using the Fuzzy Delphi Method with 12 social media content creators and policymakers; and 3) Validity assessment using the Nominal Group Technique with eight nutritionists and dietitians.

**Results:** Phase I revealed a lack of digital or technologically related models in existing nutrition interventions, with social media being the most popular platform. Nineteen factors influencing adolescents' use of social media for nutrition interventions were identified, including user characteristics, environmental factors, and social media features. In Phase II, all proposed items for the framework were accepted by the expert panel based on threshold values, expert agreement percentages, and fuzzy scores, with no additional items suggested. Phase III showed the framework's validation by experts, with agreement percentages between 91% and 98% for each item and no new items added.

**Conclusion:** In conclusion, the validated social media intervention framework aims to reduce adolescents' consumption of HED foods and SSBs, providing healthcare professionals, policymakers, organizations, and stakeholders with the knowledge to develop and enhance effective social media-based nutrition interventions.