Meta-Analysis for the Association Between Body Mass Index and Activities of Daily Living

Hanson Gabriel Nuamah (1)
Hiroshi Yatsuya (1), Md Razib Mamu (1), Young-Jae Hong (1), Zean Song (1), Tahmina Akter (1), Yuko Yoshida (1)
Yoshihisa Nakano (1), KM Saif-Ur-Rahman (1,2,3), Rei Otsuka (4)
1 : Nagoya University, Graduate School of Medicine, Public Health and Health Systems
2 : University of Galway, College of Medicine, Nursing and Health Sciences
3 : University of Galway, Evidence Synthesis Ireland and Cochrane Ireland
4 : National Center for Geriatrics and Gerontology, Epidemiology of Aging

Background : Although numerous studies have explored the relationship between body mass index (BMI) and limitations in activities of daily living (ADL), their findings have been inconsistent. To date, no comprehensive systematic review has synthesized this evidence.

Methods : This meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Six digital databases were searched from inception through August 12, 2024. The study protocol was registered with PROSPERO (ID: CRD42022357046). Abstracts and full-text articles examining the association between BMI and ADL impairment were screened using Rayyan software. The quality of the included studies was evaluated using the Risk of Bias Assessment Tool for Non-randomized Studies (RoBANS). Meta-analyses were performed using a random-effects model in MetaXL, comparing BMI categories of <18.5 (underweight), 25–29.9 (overweight), and ≥30 (obese) against the reference category of 18.5–24.9 (normal weight).

Results : From an initial pool of 25,212 records, 132 studies (1,212,298 participants) met the inclusion criteria. Meta-analytic findings indicated a significant association between obesity and ADL impairment in both longitudinal (OR: 1.77, 95% CI: 1.55–2.01) and cross-sectional studies (OR: 1.56, 95% CI: 1.38–1.76). Overweight status was linked to a modest increase in ADL impairment risk in longitudinal studies (OR: 1.24, 95% CI: 1.12–1.39), but not in cross-sectional analyses (OR: 1.04, 95% CI: 0.93–1.16). Underweight individuals showed elevated odds of ADL impairment in both longitudinal (OR: 1.23, 95% CI: 1.05–1.44) and cross-sectional studies (OR: 1.45, 95% CI: 1.24–1.71).

Conclusion : Both elevated and low BMI are associated with an increased risk of ADL limitations, underscoring the importance of maintaining a healthy weight to preserve functional independence.

The relationship between children's blood pressure and their parents' lifestyle in Aomori Prefecture

Terumi Kogawa (1)
Ryoko Tanikawa (1), Yuko Harima (1), Naoki Tanaka (1), Yamato Niioka (1), Ryo Shimizu (1)
1 : Aomori university of Health and Welfare

Background : Essential hypertension, which accounts for the majority of hypertension cases, is a multifactorial disease involving multiple genetic and environmental factors. It is well established that children of parents with hypertension have a higher risk of developing hypertension themselves. This study aimed to examine the relationship between genetic factors and parental lifestyle habits—which may serve as environmental factors—among elementary and junior high school students in Aomori Prefecture, thereby providing insights for lifestyle disease prevention strategies starting in childhood.

Method : The study included 4th and 5th grade elementary students, 1st and 2nd grade junior high students within Aomori Prefecture. Height, weight, and blood pressure measurements were conducted at each school. Parent-reported data included parental height and weight, as well as lifestyle: skipping breakfast, alcohol consumption, smoking, sleep duration, exercise duration, time spent watching TV, and time spent playing video games. For continuous variables, correlations were assessed using Pearson's correlation coefficient. Categorical variables were analyzed using chi-square tests. Furthermore, multivariate analyses were conducted for blood pressure, using children's age, obesity level, sleep duration, gaming time, exercise time, etc., as covariates. This study was conducted with the approval of the Ethics Committee.

Results : The correlation between parental and child obesity was r=0.297, and no correlation was found with the child's blood pressure values. Among parental lifestyle, no association was observed with smoking; however, parents of children with hypertension had shorter sleep durations.

Conclusion : No association was found between parental lifestyle (as part of the living environment) and children's blood pressure. This suggests that preventing childhood obesity and guiding appropriate gaming time are necessary for managing children's blood pressure.

Association between prenatal mercury exposure with child growth and development in Jepara, Indonesia

Saekhol Bakri (1,2)
Muflihatul Muniroh (3), Ainun Rahmasari Gumay (3), Rika Matsuyama (2), Athira Nandakumar (2), Shiroh Tanoue (2)
Megumi Yamamoto (4), Chihaya Koriyama (2)

1 : Department of Public Health, Faculty of Medicine Diponegoro University, Semarang, Indonesia
2 : Department of Epidemiology and Preventive Medicine, Graduate School of Medical and Dental Sciences, Kagoshima University, Kagoshima, Japan
3 : Department of Physiology, Faculty of Medicine Diponegoro University, Semarang, Indonesia
4 : Department of Environment and Public Health, National Institute for Minamata Disease, Minamata, Kumamoto, Japan

Background : Methylmercury (MeHg) is a well-known neurotoxin that can cross the blood-brain and blood-placental barriers. The relationship between low Hg exposure during pregnancy and child growth, and developmental status is debatable. One of the sources of MeHg is fish consumption. Indonesia is surrounded by the sea and has several islands. However, there are limited studies available in Indonesia to assess prenatal Hg exposure in pregnant women and its relationship with a child's growth and development. The study's objective was to investigate the association between maternal hair Hg levels and child growth development in Jepara, Indonesia

Method : The cohort study was conducted in Jepara, Central Java, and Indonesia. In 2019, 209 pregnant women were recruited for the study. We then evaluated the birth outcomes (weight, height, and head circumference) of 186 babies from these mothers and followed their growth and development until 18 months of age (n=183). We determined hair Hg levels in both mothers at recruitment and in children aged 18-months old. Information on fish consumption was also collected using a questionnaire.

Result : The median Hg levels in pregnant women and their children were 0.597 (range: 0.055–8.169) and 0.356 (0.020–10.435) ppm, respectively. Maternal Hg levels were higher in the lower education group and higher fish frequency group (p for trend < 0.05). Regression analyses revealed that maternal hair Hg level was negatively associated with the head circumference of children at 18 months of age ($p = 0.004$), although this association was not observed at birth. There was no association between maternal Hg levels and birth outcomes, other growth variables, or development in children at18-months-old.

Conclusion : Within the normal range of head size, maternal Hg level was negatively associated with head circumference in children aged 18-months-old in a coastal area of Indonesia where the Hg exposure level was low.

Patterns of Health Behavior–Mental Health Types and Prevalence of Metabolic Syndrome Components

SeEun Kim (1)
Young-Joo Won (2)

1 : Yonsei University/Graduate School/Department of Health Administration
2 : Yonsei University/College of Software and Healthcare Convergence/Division of Health Administration

Background : Metabolic syndrome is a major risk factor for cardiovascular diseases and type 2 diabetes. Although health behaviors and mental health factors have been linked to metabolic syndrome, few studies have integrated these factors. This study aimed to classify risk patterns by combining health behaviors and mental health and examine their association with metabolic syndrome.

Methods : Data from 25,104 adults aged ≥19 years in the KNHNES (2019–2023) were analyzed. Latent class analysis (LCA) was conducted by gender, incorporating health behaviors (smoking, drinking, physical activity) and mental health (stress, depression, suicidal risk). Chi-square tests compared prevalence across latent classes, and multivariate logistic regression assessed associations with metabolic syndrome and its components.

Results : A three-class model best fit the data: "healthy, mentally vulnerable and behavioral risk." In men, 48.8% were healthy, 7.5% were mentally vulnerable, and 43.8% had behavioral risks; in women, 80.6%, 10.5%, and 8.9%, respectively. Risk groups were linked to older age, lower education or income levels, and obesity. The components of metabolic syndrome were lowest in the healthy group. In men, the mentally vulnerable group had more hypertension and hyperglycemia, while the behavioral risk group showed more abdominal obesity, hypertriglyceridemia, and low HDL cholesterol. In women, the mentally vulnerable group had more hyperglycemia, and the behavioral risk group had more abdominal obesity, hypertension, and hypertriglyceridemia. Compared to the healthy group, odds of metabolic syndrome were higher in both risk groups for men (OR=1.43, 1.86) and women (OR=1.46, 1.76).

Discussion : Integrated patterns of health behaviors and mental health differed by sex, as did their associations with metabolic syndrome. Effective prevention and management require combining lifestyle improvements with mental health support tailored to sex and socioeconomic subgroups.

Association between Endometriosis and the Risk of Cancer: A Nationwide Population-Based Cohort Study

Eunji Kim (1)
Whanhee Lee (2), Jong Kil Joo (3), Eun Hee Yu (3)

1 : Pusan National University / College of Information & Biomedical Engineering / Department of Information Convergence Engineering
2 : Pusan National University / College of Information and Biomedical Engineering / School of Biomedical Convergence Engineering
3 : Pusan National University Hospital / Medical Research Institute / Department of Obstetrics and Gynecology

Objectives : Although a potential link between endometriosis and certain malignancies has been suggested, evidence on association between cancer and endometriosis is limited. This study aimed to evaluate the risk of cancer in a nationwide cohort of patients with endometriosis compared to a matched control group.

Methods : This retrospective cohort study utilized data from the Korean National Health Insurance Service (NHIS) database. We identified patients diagnosed with endometriosis (ICD-10 code N80) between 2013 and 2017, confirmed by a record of relevant surgical procedures. Individuals aged <20 or >60 at diagnosis were excluded. A 1:1 propensity score matching was performed to select a control group without endometriosis. Matching variables included age (exact matching), socioeconomic factors (health insurance type, income level, residential area), body mass index, and several comorbidities (hypertension, dyslipidemia, diabetes mellitus, chronic kidney disease, and asthma). The primary outcome was the incidence of any newly diagnosed cancer. A time-varying Cox proportional hazards model was employed to calculate the adjusted hazard ratio (aHR) and 95% confidence interval (CI) for cancer development, adjusting for the time-varying status of comorbidities.

Results : After propensity score matching, a total of 34,082 patients with endometriosis and 34,082 matched controls were included in the final analysis. Baseline characteristics were well-balanced between the groups. In the time-varying Cox model, the endometriosis cohort had a significantly higher risk of developing cancer compared to the control cohort (adjusted Hazard Ratio [aHR] = 1.09, 95% CI = 1.01 – 1.18).

Conclusions : In this large, nationwide cohort study, patients with endometriosis had a modest but statistically significant increase in the overall risk of cancer.