Reference values for grip strength parameters in older Japanese: a nationally representative survey

Satoshi Seino (1,2)
Hiroshi Murayama (2), Erika Kobayashi (2)

1 : Yamagata University
2 : Tokyo Metropolitan Institute for Geriatrics and Gerontology

Background : Handgrip strength (HGS) is a prevalent health indicator for older adults. While recent evidence has reported an importance of HGS asymmetry and accounting for body size, population-specific reference values remain sparse. This study aimed to establish age- and sex-specific reference values for HGS parameters using a nationally representative sample.

Methods : Data from 1,197 adults aged ≥60 years (598 men and 599 women) including complete HGS measurements (completion rate: 49%) obtained from the National Survey of the Japanese Elderly in 2012 were analyzed. HGS was measured twice for each hand during home visits. We calculated means for maximum HGS and HGS normalized by height squared (HGS/HT^2), prevalence of low HGS (<28 kg for men and <18 kg for women), and asymmetry ratio (stronger/weaker hand) medians, stratified by sex and five-year age groups.

Results : Mean HGS and HGS/HT^2 were significantly lower in older age groups, ranging from 37.5 kg and 13.5 kg/m^2 at ages 60–64 to 25.3 kg and 10.7 kg/m^2 at ≥85 years in men, and from 23.8 kg and 10.1 kg/m^2 to 15.9 kg and 8.0 kg/m^2 in women ($P < 0.001$ for trend). Prevalence of low HGS increased significantly with age, from 5.7% at ages 60–64 to 64.7% at ≥85 years in men, and from 6.0% to 61.5% in women ($P < 0.001$ for trend). Median asymmetry ratio values showed no significant age-related trend, with age-adjusted values of 1.10 (10% asymmetry; 95% confidence interval: 1.09–1.11) in men and 1.12 (12% asymmetry; 95% confidence interval: 1.11–1.13) in women.

Conclusions : This nationally representative study established age- and sex-specific reference values for multiple HGS parameters in older Japanese adults. Maximum HGS and HGS/HT^2 decreased with age and low HGS prevalence increased substantially in both men and women, whereas HGS asymmetry remained stable across age groups. These findings provide essential reference data for clinical assessments and epidemiological research on aging.

Unmitigated serial interval and intervention efficiency in a 2024 pertussis outbreak, South Korea

Bianca De Padua (1,2)
Andrei R. Akhmetzhanov (1,2)

1 : Institute of Epidemiology and Preventive Medicine, College of Public Health, National Taiwan University
2 : Global Health Program, College of Public Health, National Taiwan University

Introduction : Pertussis cases have resurged globally due to waning vaccine immunity, disrupted vaccination, and reduced transmission after COVID-19. In 2024–2025, Japan and South Korea saw >15-fold increases, alongside rising reports of antibiotic-resistant *B. pertussis*. With much unknown on pertussis epidemiology, a 2024 school-based outbreak in South Korea enabled us to quantify epidemiological time intervals such as the serial interval (SI) and assess the impact of public health interventions, i.e. isolation and contact tracing, on transmission.

Method : To estimate the SI and evaluate intervention effects, we fitted transmission-pair data with a latent transmission model accounting for two changes: a shortened SI and fewer secondary cases due to intervention. We quantified the impact using a transmission-reduction parameter (ε), ranging from 0 (no effect) to 1 (total prevention). Secondary cases were modeled with a negative binomial distribution. The model estimated both the unmitigated SI distribution and the observed SI assuming no intervention.

Results : We estimated a mean unmitigated SI of 15.1 days (95% credible interval: 9.7–26.6), broader than the mean observed SI of 11.0 days (8.1–15.3). While both SI medians were under 10 days, the unmitigated SI had a heavier tail, with values up to 40 days. The pre-intervention effective reproduction number R_0 was 1.4 (0.65–2.6), falling to 0.45 (0.15–1.01; 95th percentile: 0.87) post-intervention. Intervention efficiency (ε) was 65% (26%–88%).

Conclusion : Isolation of confirmed cases, even when delayed, was sufficient to curb transmission. Higher intervention efficiency may be achievable with faster confirmation and isolation. However, the effect of isolation cannot be separated from complementary interventions such as active case finding and targeted prophylaxis for close contacts. Together, these measures framed as a “test-trace-isolate” strategy were likely central to the successful outbreak control.

Interactive Theatre to Improve Smoking Harms Literacy in Hong Kong Primary Students: Pre-Post Study

Sze Lam Luk (1)
Shiu Lun Au Yeung (1)

1 : School of Public Health, LKS Faculty of Medicine, The University of Hong Kong

Background : Improving literacy in smoking-related harms using innovative approaches, such as education theatre programmes, in primary school students can potentially reduce their likelihood of taking up smoking behaviour. Using a pre- and post-study, we evaluated how the use of a school Interactive Education Theatre Programme (ET) tour impacted tobacco-related knowledge, attitudes, and behaviours among primary students in Hong Kong.

Methods : In this pre- and post-study, we included 3,544 Primary 2-4 students, who were randomized by class into pre-test (n = 1,730) and post-test (n = 1,814) groups. Pre- and post-test questionnaires were administered before and after the theatre performance to assess changes in tobacco-related knowledge, acceptability of smoking and views towards the tobacco industry. The assessment was based on the degree of agreement (on a 5-item Likert scale) with given statements. We also collected students' ratings of the performance. Differences in scores between the pre- and post-test groups were estimated using a multilevel linear regression model to control for clustering by school class.

Results : By comparing the pre- and post-test groups, we found significant improvements in four knowledge items, including smoking-related mortality (ß: 0.30) and disease (ß: 0.33), and the harms of secondhand smoke (SHS) (ß: 0.24) and thirdhand smoke (THS) (ß: 0.30) (all $P < 0.01$), but not acceptability of smoking and views towards the tobacco industry ($p > 0.05$). Amongst the post-test group, 79.9% rated the performance as good or above, and 80.9% indicated that they "strongly want" or "want" to see future performances. A significant proportion of students (82.1%) in the post-test group reported a reduced likelihood of smoking in the future after seeing the performance.

Conclusions : The use of a school interactive ET programme can improve literacy in smoking-related harms, and potentially reduce the future uptake of smoking behaviour.

Impact of Health Check-ups and Guidance in the Japanese Population: A Database-based Cohort Study

Masanori Nojima (1)
Yukio Shimasaki (2)

1 : Center for Translational Research, The Institute of Medical Science, The University of Tokyo
2 : Graduate School of Frontier Science, The University of Tokyo

Introduction : This retrospective cohort study aimed to evaluate the effect of a health check-up program on various health parameters over a long-term period in accordance with a long-standing practice of health check-ups and guidance in Japan.

Methods : Data from three prefectures in the Kanto region, encompassing individuals receiving health check-ups (aged 40 to 74) between 2008 and 2018, were obtained from NDB.

Results : The analysis suggests that receiving active or motivational support was associated with reductions in metabolic syndrome indicators among participants with multiple visits (N = 2,372,239). In the year following active support, risk reductions were observed for systolic blood pressure≥130 mmHg (-17% in both sexes), triglycerides≥150 mg/dL (-27% in both sexes), HbA1c≥5.6% (-20.7% in men and -17.8% in women), body mass index≥25 (-41.2% and -49.3% in men and women). Although the magnitude of effect on each indicator was about half that of active support, receiving motivational support was similarly associated with improvements in most indicators. Analysis based on a fuzzy regression discontinuity design provides robustness of the results. When individuals missed health check-ups, the risks of hypertension and high triglycerides were increased by 5–10% and 5–20%, respectively. Additionally, undergoing regular check-ups—defined as receiving health check-ups at every opportunity vs. two times or fewer within five years—was associated with a reduced risk of high blood pressure, high triglycerides, elevated HbA1c, and high BMI in both men and women particularly in individuals covered by national healthcare insurance.

Conclusions : Our findings suggest that the health guidance in the Japan's specific health check-up programs in a general population are associated with improved health outcomes. Regular engagement also appears to be linked to sustained health benefits, highlighting the importance of strategies to enhance the long-term participation.

Three-Point Metabolomic Trajectories for Diabetes Prediction: The Tsuruoka Metabolomics Cohort Study

Ryota Toki (1)
Sei Harada (1), Atsuko Miyake (1), Aya Hirata (1), Miho Iida (1), Minako Matsumoto (1), Naoko Miyagawa (1)
Shun Edagawa (1), Tomonori Okamura (1), Toru Takebayashi (1)

1 : Department of Preventive Medicine and Public Health, Keio University School of Medicine

Background and Aims : Single-time-point metabolomic profiles predict incident diabetes (DM), but the added value of longitudinal trajectories is uncertain. We tested whether three-time-point trajectory features improve DM prediction beyond baseline in a community cohort.

Methods : We analyzed 3,096 TMCS participants who completed Wave 1 (W1; baseline), Wave 2 (W2), and Wave 3 (W3) and were DM-free at W1.71 plasma metabolites quantified by CE-MS were included, meeting a predefined reproducibility filter (CV<30%, ICC≥0.4, QC change<10%). For each metabolite, we computed trajectory features (W1–W2–W3 slope, curvature, 3-point SD). Incident DM at W3 was ascertained by nurse interview using a structured questionnaire. We compared an elastic-net model using W1 values alone with a model adding trajectory features (DeLong test). In parallel, single-metabolite multivariable models (adjusted for age, sex, and BMI) assessed metabolite-specific gains.

Results : During follow-up, 190/3,096 (6.1%) developed DM. At the metabolome-wide level, adding trajectory features yielded a modest, non-significant AUC gain over the W1-only model (0.826 vs 0.813; ΔAUC +0.013; p=0.247). In contrast, single-metabolite analyses showed meaningful improvements for specific metabolites—most notably 2-hydroxybutyrate (W1 AUC 0.787 vs combined 0.811; Δ+0.024; p=0.036)—with similar patterns for branched-chain amino acids (e.g., leucine Δ+0.019, valine Δ+0.017; nominal p<0.05).

Conclusions : Three-time-point metabolomic trajectories did not materially improve overall DM prediction but provided meaningful gains for select metabolites, particularly 2-hydroxybutyrate and branched-chain amino acids. These findings align with early alterations in amino acid catabolism and redox metabolism linked to the progression of insulin resistance. Future studies should validate these observations in independent cohorts and determine the optimal timing for trajectory assessment in clinical practice.