

MEDIA RELEASE

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WEAK MUSCLE STRENGTH LINKED TO PREVALENCE OF DIABETES AMONG MIDLIFE WOMEN

In a study of 1,170 midlife women, NUHS researchers found that low hand grip muscle strength and poor repeated chair stand performance are strongly associated with diabetes, independent of obesity

Singapore — Diabetes is a major public health concern in Singapore and globally due to its contribution to increased risks for mortality and morbidity. Across the world, the number of adults with diabetes quadrupled from 108 million in 1980 to 422 million in 2014¹. In Singapore, diabetes affects 8.4 per cent of female adults² and one in every five adults are predicted to have diabetes by 2035³. Although established factors such as older age, obesity, smoking, and physical activity are known to be associated with diabetes risk, there are a number of other factors that remain unexplained. Few studies have examined the contribution of declining muscle strength to diabetes in midlife women.

Researchers from the National University Hospital (NUH) and the Yong Loo Lin School of Medicine, National University of Singapore, conducted a study with 1,170 Chinese, Malay, and Indian women participants between the age of 45 and 69 years last year. They found that midlife women with poor muscle strength had more than two times the risk of diabetes compared to those with normal muscle strength. This association was independent of other known risk factors for diabetes such as age, race, education levels, menopausal status, smoking and obesity.

The study involved assessing participants' upper and lower body muscle strength through handgrip strength⁴ measured using a hand-held hydraulic dynamometer, and lower limb strength using the Five-Repetition Chair Stand Test. Among the 1,170 participants, 12 per cent had diabetes which was confirmed through a fasting blood glucose test.

As part of the study objective, the researchers also determined that combined muscle strength is a better association to diabetes, compared to either upper or lower body muscle strength alone.

Led by Professor Yong Eu Leong, Emeritus Consultant, Dr Susan Logan, Senior Consultant, and Research Assistant Ms Beverly Wong from the NUH Department of Obstetrics and Gynaecology, under the National University Health System (NUHS)' Integrated Women's Health Programme (IWHP), the study findings were published in the *International Journal of*

¹ NCD Risk Factor Collaboration. Worldwide trends in diabetes since 1980: A pooled analysis of 751 population-based studies with 4.4 million participants. *Lancet* 2016, 387, 1513–1530.

² The Singapore Department of Statistics. Prevalence of overweight, obesity, daily smoking, hypertension, diabetes mellitus, hyperlipidaemia, sufficient total physical activity and binge drinking among residents aged 18-74 years, Year 2020. <https://tablebuilder.singstat.gov.sg/table/TSM870401>

³ Wong, L.Y.; Toh, M.P.; Tham, L.W. Projection of prediabetes and diabetes population size in Singapore using a dynamic Markov model. *J. Diabetes* 2017, 9, 65–75.

⁴ Handgrip strength is a convenient and reproducible method used to measure upper body muscle strength and is commonly regarded as a proxy for overall muscle strength.

Environmental Research and Public Health in October 2022⁵. Past studies under the IWHP cohort have also found that a high proportion of midlife women in Singapore experience sexual dysfunction⁶.

Professor Yong said, “Our study supports the growing recognition of the important role of muscle strength on diabetes. Remarkably, this effect of muscle strength on diabetes is independent of body fat. We propose a composite muscle strength index combining both upper and lower body muscle strength to better assess the risk of diabetes. As a public health measure, women in Singapore should be encouraged to include resistance exercises in their daily regime to increase muscle strength.”

The researchers highlighted that further longitudinal studies are required to better understand the cause-effect relationship between muscle strength and diabetes. Longitudinal follow up cohort studies are currently being performed on midlife Singapore women to further confirm this relationship.

Chinese Glossary

National University Health System (NUHS)	国立大学医学组织 (国大医学组织)
National University Hospital (NUH)	国立大学医院 (国大医院)
Yong Loo Lin School of Medicine, National University of Singapore (NUS Medicine)	新加坡国立大学杨潞龄医学院 (国大杨潞龄医学院)
Professor Yong Eu Leong, Emeritus Consultant, Department of Obstetrics and Gynaecology, National University Hospital	杨有亮教授 荣誉顾问医生 国大医院妇产科
Dr Susan Logan, Senior Consultant, Division of Reproductive Endocrinology & Infertility, Department of Obstetrics and Gynaecology, NUH	Dr Susan Logan 高级顾问医生 国大医院妇产科
Ms Beverly Wong Research Assistant, Department of Obstetrics and Gynaecology, NUH	黄温馨女士 研究助理, 国大医院妇产科
Integrated Women’s Health Programme (IWHP)	女性综合健康计划

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⁵ Int. J. Environ. Res. Public Health 2022, 19(20), 13654; <https://doi.org/10.3390/ijerph192013654>

⁶ Maturitas, Volume 152, P1-9, 1 October 2021. [https://www.maturitas.org/article/S0378-5122\(21\)00122-5/fulltext](https://www.maturitas.org/article/S0378-5122(21)00122-5/fulltext)

About the National University Health System

The National University Health System (NUHS) aims to transform how illness is prevented and managed by discovering causes of disease, development of more effective treatments through collaborative multidisciplinary research and clinical trials, and creation of better technologies and care delivery systems in partnership with others who share the same values and vision.

Institutions in the NUHS Group include the National University Hospital, Ng Teng Fong General Hospital, Jurong Community Hospital and Alexandra Hospital; three National Specialty Centres - National University Cancer Institute, Singapore (NCIS), National University Heart Centre, Singapore (NUHCS) and National University Centre for Oral Health, Singapore (NUCOHS); the National University Polyclinics (NUP); Jurong Medical Centre; and three NUS health sciences schools – NUS Yong Loo Lin School of Medicine (including the Alice Lee Centre for Nursing Studies), NUS Faculty of Dentistry and NUS Saw Swee Hock School of Public Health.

With member institutions under a common governance structure, NUHS creates synergies for the advancement of health by integrating patient care, health science education and biomedical research.

As a Regional Health System, NUHS works closely with health and social care partners across Singapore to develop and implement programmes that contribute to a healthy and engaged population in the Western part of Singapore.

For more information, please visit www.nuhs.edu.sg/.

About the National University Hospital

The National University Hospital (NUH) is the first university hospital in Singapore, and a major tertiary and referral institution. While NUH opened its doors on 24 June 1985, its legacy goes back to the founding of what is today the NUS Yong Loo Lin School of Medicine in 1905. It is the principal teaching hospital of the medical school and the NUS Faculty of Dentistry.

An Academic Medical Centre under Singapore's National University Health System, NUH provides affordable specialist care for patients, training for healthcare professionals, and undertakes translational bench-to-bedside research to improve care.

It is the only public and not-for-profit hospital in Singapore to offer a comprehensive suite of specialist care for adults, women and children, as well as paediatric kidney and liver transplant programme.

Visit our website at www.nuh.com.sg/.

About the NUS Yong Loo Lin School of Medicine (NUS Medicine)

The NUS Yong Loo Lin School of Medicine is Singapore's first and largest medical school. Our enduring mission centres on nurturing highly competent, values-driven and inspired healthcare professionals to transform the practice of medicine and improve health around the world.

Through a dynamic and future-oriented five-year curriculum that is inter-disciplinary and inter-professional in nature, our students undergo a holistic learning experience that exposes them to multiple facets of healthcare and prepares them to become visionary leaders and compassionate doctors and nurses of tomorrow. Since the School's founding in 1905, more than 12,000 graduates have passed through our doors.

In our pursuit of health for all, our strategic research programmes focus on innovative, cutting-edge biomedical research with collaborators around the world to deliver high impact solutions to benefit human lives.

The School is the oldest institution of higher learning in the National University of Singapore and a founding institutional member of the National University Health System. It is one of the leading medical schools in Asia and ranks among the best in the world (Times Higher Education World University Rankings 2023 by subject and the Quacquarelli Symonds (QS) World University Rankings by subject 2022).

For more information about NUS Medicine, please visit <https://medicine.nus.edu.sg/>