ABSTRACT

Declining in physical performance due to aging is a growing public health problem. This study was conducted to determine the association between *ACTN/ACE* polymorphism and pysical performance also related of risk factors to physical performance in elderly. Methods: This cross sectional study involved 172 elderly from nursing homes in Jakarta. The polymorphism was performed by PCR-RFLP methods. Musle mass(Mm), gripstrength(Gs), and physical performance(Pp), also cognitive, depression, antropometric, lipid profile, blood glucose and blood pressure were evaluated. Muscle strength(Ms), aerobic endurance(Ae), mobility(Mb), and flexibility(Fl) are the components assessed in Pp. Statistical analysis was examined to determine differences in genotype groups with t test, ancova, manova, and mancova, regression, product moment, Hardy-Weinberg equilibrium, and ROC. Result : Mean age of subjects 72.7 years, mostly female, low education level, normal cognitive and no depression. Mean of Mm,Gs of elderly men/women were 17.8/14.3kg, 18.8/12kg and it was lower than elderly with 7 normal categories, and so is Pp components. Mm and Gs were correlated with some of Pp components. Gs was slightly stronger correlated with Pp than Mm. Distribution of *ACE* and *ACTN* gene frequencies are II>ID>DD, and RX>RR>XX but for the *ACE* genotype were not consistent with the HWE. Subjects with the DD/RR genotype showed lower Mm, Gs, and in all Pp component, except Fl than other genotypes. In combination genotype, only subject with DD+RR was significantly lower Mb than others. The *ACTN3* RR genotype that adjusted by gender and age had a lower Mb significantly. *ACE* and *ACTN* genes were associated with increased risk of declining muscle performance in elderly, after adjustment for potential confounders. Furthermore, tests showed the polymorphism genes significantly contributed to Ms, Ae, and Mb when adjusted by age, muscle mass, gripstrength, and BMI. This study showed that in an elderly population in Jakarta with DD/RR genotype *ACE/ACTN* gene were associated with lower muscle strength, aerobic endurance, mobility. These results suggest the role of the risk factor of physical performance as a potential mediator in the association between *ACE* and *ACTN* genes to physical performance. It might provide additional evidence of DD and RR genotpe in the declining of physical performance in elderly, which is important for clinical. Gene polymorphism and risk factor are important factors for future study to prevent decrease physical performance in elderly.

Keywords: Alpha-actinin-3 gene, *ACE* gene, muscle mass, gripstrength, muscle performance, elderly, Indonesia

ABSTRAK

Masalah penurunan performa fisik pada usia lanjut akibat penuaan cukup besar. Polimorfisme R577X gen *ACTN3* dan I/D gen *ACE* merupakan salah satu gen yang paling sering diteliti terkait performa fisik, namun hasilnya masih kontroversi. Penelitian ini bertujuan mengetahui hubungan polimorfisme R577X gen *ACTN3* dan I/D gen *ACE* dengan performa fisik (PF). Penelitian potong lintang dilaksanakan pada bulan Oktober 2016 di empat Panti Sosial Tresna Wredha Budi Mulia DKI Jakarta. Pemeriksaan polimorfisme gen, massa otot (MO), kekuatan otot genggaman tangan (KOGT), tingkat kognitif, depresi, status antropometrik, profil lipid, glukosa darah, dan tekanan darah serta keenam komponen PF meliputi kekuatan otot ekstremitas atas/bawah (KOEA/B), ketahanan aerobik (KA), mobilitas (Mb), dan fleksibilitas ekstremitas atas/bawah (FEA/B) dilakukan pada usia lanjut yang mampu beraktivitas dasar secara mandiri dan berkomunikasi dengan baik. Uji perbedaan rerata, korelasi dan kesetimbangan *Hardy-Weinberg Equation* (HWE) menggunakan Anova, uji t, Ancova, kurva *Receiver Operating Control, Product moment*, Regresi, uji stratifikasi *Maentel Hensel*, *Chi-Square*, Manova, dan Mancova. Hasil penelitian pada 172 usia lanjut dengan rerata usia 72,7 tahun dan tingkat pendidikan rendah (67%) menunjukkan bahwa (a) rerata MO dan KOGT pada laki-laki/perempuan adalah 17,8/14,3kg dan18.8/12kg. Nilai ini lebih rendah dari kelompok subyek dengan 7 kategori sehat, begitu pula nilai rerata komponen PF; (b) Massa otot, KOGT berkorelasi terhadap PF dengan nilai korelasi KOGT lebih besar dibandingkan MO; (c) Distribusi frekuensi gen *ACE* adalah II> ID> DD (tidak berada dalam kesetimbangan HWE), dan gen *ACTN3* adalah RX> RR> XX; (d) Rerata MO, KOGT dan PF pembawa genotipe DD, RR dan DD+RR paling rendah dibandingkan genotipe lainnya. Rerata Mb pembawa genotipe RR lebih rendah signifikan setelah dikontrol jenis kelamin dan usia. Gen *ACE* dan *ACTN3* berhubungan dengan peningkatan risiko penurunan PF, setelah dikontrol dengan *confouding factor*. Uji multivariat menunjukkan polimorfisme gen berkontribusi terhadap kekuatan otot, ketahanan aerobik, dan mobilitas setelah dikontrol usia, massa otot, kekuatan genggaman tangan, dan IMT. Penelitian ini menunjukkan bahwa (1) populasi usia lanjut di Jakarta dengan pembawa genotipe DD/RR gen *ACE*/*ACTN3* berhubungan dengan performa fisik yang lebih rendah dan (2) faktor risiko performa fisik merupakan potensial mediator terhadap hubungan polimorfisme gen dengan perfoma fisik. Hal ini menambah bukti peran genotipe DD dan RR gen *ACE*/*ACTN3* serta faktor risiko penurunan performa fisik, turut menjadi faktor penting dalam mencegah penurunan performa fisik usia lanjut.

*Keywords***:** Gen *alpha-actinin-3*, gen *angiotensin convertyng enzyme*, massa otot, kekuatan otot genggaman tangan, performa fisik, usia lanjut, Indonesia