PERBANDINGAN AKTIVASI OTOT *QUADRICEPS FEMORIS* DAN *HAMSTRING* PASKA LATIHAN PENGUATAN OTOT INTENSITAS TINGGI ANTARA METODE *AGONIST-ANTAGONIST PAIRED SET* DENGAN METODE *TRADITIONAL SET* PADA SUBYEK SEHAT TIDAK TERLATIH

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Abstrak

Objektif: Aktivitas fungsional sehari-hari yang seperti melompat, berjalan, berlari, maupun naik turun tangga membutuhkan stabilitas dinamis sendi lutut yang baik. Stabilitas dinamis sendi lutut berperan penting untuk menghindari cedera saat melakukan aktivitas fungsional tersebut. Salah satu prediktor stabilitas sendi lutut dinamis adalah *single-leg hop* (SLH). Stabilitas dinamis sendi lutut dapat ditingkatkan salah satunya dengan latihan penguatan yang bertujuan menyeimbangkan otot agonis (*quadriceps femoris*) dan otot antagonis (*hamstring*) dengan metode *agonist-antagonist paired set* (APS). Latihan penguatan dengan metode APS juga dikaitkan dengan peningkatan rekrutmen unit motor dan aktivasi otot. Tujuan studi ini adalah untuk mengetahui efek latihan penguatan metode APS terhadap aktivasi otot *quadriceps femoris* dan *hamstring* saat melakukan SLH.

Metode: Subyek penelitian ini 14 laki-laki sehat tidak terlatih berusia 18-40 tahun yang terbagi menjadi 2 perlakuan yaitu kelompok APS dan kelompok *traditional set* (TS). Variabel yang dievaluasi adalah aktivasi otot *vastus medial* (VM), *vastus lateral* (VL), biceps femoris (BF), dan semitendinosus (ST) yang dinilai dengan *surface electromyograpy* (sEMG).

Hasil: Kelompok APS tidak didapatkan perbedaan aktivasi otot VM (p=0.86), VL (p=1.0), BF (p=0.95), ST (p=0.27) sebelum dan sesudah latihan. Kelompok TS tidak didapatkan perbedaan aktivasi otot VM (p=0.61), BF (p=0.74), ST (p=0.58), sedangkan VL mengalami peningkatan aktivasi (p=0.02) sebelum dan sesudah latihan.

Kesimpulan: Latihan penguatan otot *quadriceps femoris* dan *hamstring* metode APS dan TS tidak meningkatkan aktivasi otot *quadriceps femoris* dan *hamstring*. Metode APS memiliki kelebihan dibandingkan dengan metode TS dari segi waktu yang relatif lebih singkat dengan hasil yang sebanding.

Kata kunci: aktivasi otot, rekrutmen unit motor, *surface electromyography*, *single-leg hop*, stabilitas sendi lutut dinamis, *agonist-antagonist paired set*

COMPARISON OF QUADRICEPS FEMORIS AND HAMSTRING MUSCLE ACTIVATION POST HIGH INTENSITY MUSCLE STRENGTHENING EXERCISE BETWEEN AGONIST-ANTAGONIST PAIRED SET METHOD VERSUS TRADITIONAL SET METHOD IN UNTRAINED HEALTHY SUBJECTS

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Abstract

Objectives: Daily functional activities such as jumping, walking, running, and going up and down stairs need good dynamic knee stability. The dynamic knee stability plays an important role in avoiding injury while performing these functional activities. One predictor of dynamic knee stability is single-leg hop (SLH). The dynamic knee stability can be improved, one of which is by strengthening exercise that aims to balance the agonist muscles (quadriceps femoris) and antagonist muscles (hamstring) with the agonist-antagonist paired set (APS) method. Strengthening exercise with the APS method is also associated with increased motor unit recruitment and muscle activation. The purpose of this study was to determine the effect of the strengthening exercise using APS method on quadriceps femoris and hamstring muscle activation when performing SLH.

Methods: The subjects of this study were 14 untrained healthy men aged 18-40 years who were divided into 2 intervention groups, APS and traditional set (TS). The variables evaluated were muscle activation of vastus medial (VM), vastus lateral (VL), biceps femoris (BF), and semitendinosus (ST) which were assessed by surface electromyography (sEMG).

Results: In the APS group, there were no differences in muscle activation of VM ($p = 0.86$), VL ($p = 1.0$), BF ($p = 0.95$), ST ($p = 0.27$) before and after exercise. In the TS group, there were no differences in muscle activation of VM ($p = 0.61$), BF ($p = 0.74$), ST ($p = 0.58$), while VL experienced increased activation ($p = 0.02$) before and after exercise.

Conclusion: Quadriceps femoris and hamstring muscle strengthening exercise using APS and TS methods do not increase quadriceps femoris and hamstring muscle activation. The APS method has advantages compared to the TS method in terms of a relatively shorter time with comparable results.

Keywords: muscle activation, motor unit recruitment, surface electromyography, single-leg hop, dynamic knee stability, agonist-antagonist paired set