

INTISARI

PENGARUH PEMBERIAN BOLU KACIDE TINGGI BRANCHED CHAIN AMINO ACIDS TERHADAP PEMBENTUKAN OTOT PADA ATLET *WEIGHT SPORT*

Voila Devi Evandhani¹, Mirza Hapsari STP², Harry Freitag LM.²

Latar Belakang: Hipertrofi otot diyakini merupakan bentuk adaptasi otot untuk meningkatkan kekuatan dan daya tegang seiring dengan bertambahnya beban atau kerja yang harus dilakukan. Pada olahraga *weight sport*, hipertrofi menjadi komponen yang penting. Protein telah banyak diteliti sebagai molekul penting untuk mendukung hipertrofi otot terutama untuk menyusun komponen-komponen kontraktile otot serta menunda kelelahan otot. Suplementasi *Branched Chain Amino Acids* (BCAA) diketahui dapat membantu meningkatkan sintesis protein, menunda kelelahan, serta mengurangi kerusakan sel otot akibat latihan. Alternatif suplementasi BCAA berbasis pangan telah dikembangkan, yaitu dalam bentuk bolu berbahan dasar kapri, biji kecipir, dan tempe kedelai (KACIDE). Daya terima dan analisis zat gizi telah dilakukan akan tetapi efek pemberian bolu tersebut pada pembentukan otot belum diketahui.

Tujuan Penelitian: Penelitian ini dilakukan untuk mengetahui efek pemberian bolu KACIDE tinggi BCAA terhadap pembentukan otot dengan parameter *flexed arm girth*, *arm muscle area*, persen otot, persen lemak, dan somatotype.

Metode: Metode penelitian yang dilakukan adalah eskperimental dengan desain *cross over*. Tujuh orang atlet *weight sport* dengan jenis kelamin laki-laki diikutkan dalam program latihan beban selama 4 minggu dengan frekuensi 3 kali seminggu. Tiga puluh menit sebelum latihan, subjek diberikan bolu yang berupa bolu biasa untuk kelompok kontrol dan bolu KACIDE untuk kelompok intervensi. Setelah menjalani periode latihan tersebut subjek diistirahatkan selama 30 hari sebagai periode *washout*, kemudian dilanjutkan proses *cross over*. *Flexed arm girth* dan *arm muscle area* diukur menggunakan *metline*, persen otot dan lemak diukur menggunakan *Bioelectrical Impedance Analysis*, sedangkan *somatotype* diukur menggunakan *metline*, *skinfold caliper* dan *sliding caliper*.

Hasil: *Flexed arm girth* cenderung mengalami peningkatan sebesar 0,75% (kanan) dan 0,95% (kiri) pada kelompok kontrol serta 3,46% (kanan) dan 3,65% (kiri) pada kelompok intervensi, namun peningkatan tersebut tidak bermakna dengan nilai p 0,240 (kanan) dan 0,424 (kiri) untuk kelompok kontrol dan 0,080 (kanan); 0,075 (kiri) untuk kelompok intervensi. Rata-rata selisih peningkatan *flexed arm girth* pada kelompok intervensi lebih besar dibandingkan dengan kelompok kontrol namun tidak bermakna p 0,140 (kanan) dan 0,178 (kiri). *Arm*

muscle area pada kelompok kontrol cenderung mengalami penurunan sebesar 1,82% dengan p 0,643 (kanan) dan 1,52% dengan p 0,674 (kiri), sedangkan pada kelompok intervensi cenderung meningkat sebesar 7,27% dengan p 0,223 (kanan) dan 4,99% p 0,474 (kiri). Selisih peningkatan cenderung lebih besar pada kelompok intervensi dibandingkan dengan kelompok kontrol, akan tetapi perbedaan tersebut tidak bermakna dengan p 0,195 (kanan) dan 0,395 (kiri). Hasil pengukuran persen otot kelompok kontrol menunjukkan penurunan pada kelompok kontrol sebesar 0,48% (total), 0,5% (*trunk*), 0,75% (*arms*), dan 0,32% (*legs*). Tidak ditemukan perbedaan bermakna dengan p 0,396 (total), 0,611 (*trunk*), 0,149 (*arms*), dan 0,395 (*legs*). Pengukuran persen otot kelompok intervensi menunjukkan tidak ada perubahan pada otot total, penurunan 0,3% pada *trunk*, dan 0,4% pada *arms*, dan 0,2% pada *legs*. Nilai p masing-masing 0,963 (total), 0,815 (*trunk*), 0,271 (*arms*), dan 0,709 (*legs*). Tidak terdapat perbedaan pada kedua kelompok dengan p masing-masing 0,65 (total), 0,94 (*trunk*), 0,29 (*arms*), serta 0,84 (*legs*). Hasil pengukuran persen lemak kelompok kontrol menunjukkan penurunan 4,96% (total subkutan), peningkatan 0,2% (*trunk*), peningkatan 5,6% (*arms*), dan penurunan 1,2% (*legs*). Tidak ditemukan perbedaan signifikan dengan nilai p 0,21 (total subkutan), 0,90 (*trunk*), 0,47 (*arms*), dan 0,72 (*legs*). Persen lemak kelompok intervensi mengalami penurunan sebesar 7,39% (total subkutan), peningkatan sebesar 0,68% (*trunk*), 2,7% (*arms*), dan 0,1% (*legs*). Tidak ditemukan perbedaan signifikan dengan nilai p 0,40 (total subkutan), 0,87 (*trunk*), 0,63 (*arms*), dan 0,97 (*legs*). Tidak terdapat perbedaan bermakna antara selisih persen lemak pada kelompok kontrol dan intervensi dengan nilai p 0,74 (total subkutan), 0,96 (*trunk*), 0,78 (*arms*), dan 0,81 (*legs*). Hasil *somatotype mesomorph* kelompok kontrol tidak mengalami perubahan, nilai *endomorph* mengalami peningkatan 8,8%, *ectomorph* mengalami penurunan sebesar 4%. Tidak ditemukan perbedaan yang signifikan pada kelompok kontrol dengan nilai p 0,360 (*endomorph*), 0,673 (*mesomorph*), dan 0,822 (*ectomorph*). Pada kelompok intervensi *mesomorph* mengalami penurunan 2,1%, *endomorph* mengalami peningkatan 13,5%, dan *ectomorph* mengalami peningkatan 18%. Tidak ditemukan perubahan yang signifikan pada kelompok intervensi dengan nilai p 0,254 (*endomorph*), 0,822 (*mesomorph*), dan 0,164 (*ectomorph*). Selisih *endomorph* pada ke-dua kelompok cenderung mengalami kenaikan, *mesomorph* mengalami kenaikan pada kelompok kontrol dan penurunan pada kelompok intervensi, *ectomorph* cenderung mengalami penurunan pada kelompok kontrol dan peningkatan pada kelompok intervensi. Tidak ditemukan perbedaan yang signifikan antara dua kelompok dengan nilai p 0,707 (*endomorph*), 0,689 (*mesomorph*), dan 0,063 (*ectomorph*).

Kesimpulan: Tidak terdapat perbedaan signifikan pada *flexed arm girth*, *arm muscle area*, *persen otot*, *persen lemak*, serta nilai *somatotype* sebelum dan setelah masa latihan beban pada kelompok yang diberikan bolu biasa. Tidak terdapat perbedaan signifikan pada *flexed arm girth*, *arm muscle area*, *persen otot*, *persen lemak*, serta nilai *somatotype* sebelum dan setelah masa latihan beban

pada kelompok yang diberikan bolu KACIDE. Tidak terdapat perbedaan signifikan pada selisih *flexed arm girth*, *arm muscle area*, persen otot, persen lemak, serta nilai *somatotype* sebelum dan setelah masa latihan beban antara kelompok yang diberikan bolu biasa dengan yang diberikan bolu KACIDE.

Kata kunci: BCAA, *branched chain amino acids*, latihan beban, pembentukan otot, *flexed arm girth*, *arm muscle area*, *persen otot*, *persen lemak*

1. Mahasiswa Program Studi Gizi Kesehatan FK UGM
2. Program Studi Gizi Kesehatan FK UGM

ABSTRACT

THE EFFECT OF THE ADMINISTRATION OF KACIDE SPONGE CAKE HIGH IN BRANCHED CHAIN AMINO ACIDS ON MUSCLE FORMATION ON WEIGHT SPORT ATHLETES

Voila Devi Evandhani¹, Mirza Hapsari STP², Harry Freitag LM.²

Background: Muscle hypertrophy is believed as a form of muscle adaptation to improve strength and tension in response to the increase of load or work. In weight sport, hypertrophy has become an important component. Protein has been largely researched as an important molecule with the ability to support muscle hypertrophy, especially as building blocks of muscle contractile components as well as to delay muscle fatigue. Branched chain amino acids (BCAA) is known to help increase protein synthesis, delay fatigue, and decrease muscle cell damage due to exercise. An alternative source of BCAA supplementation has been developed in the form of sponge cake with the ingredients of pea, cowbean, and soybean tempeh. The ingredients altogether are known as KACIDE. The receptivity and nutrients analysis on the KACIDE sponge cake has been conducted, however the effect of muscle formation has not been researched.

Objectives: This research is done to investigate the effect of the administration of KACIDE sponge cake high in BCAA on muscle formation with the parameter of flexed arm girth, arm muscle area, muscle percentage, fat percentage, and somatotype.

Methods: The study utilized experimental design with cross over. Seven male weight sport athletes were assigned on a weight training program that took place for 4 weeks with the frequency of thrice a week. Thirty minutes prior to perform exercise, subjects were given a portion of sponge cake. Regular sponge cakes were given to control group. Whereas KACIDE sponge cakes were given to treatment group. After finishing the first periode of weight training, subjects was given 30 days of rest as a washout period. After undergoing a washout period, subjects then crossed over to opposite group. Flexed arm girth and arm muscle area were measured with metline, muscle and fat percentage were measured with bioelectrical impedance analysis, whereas somatotype was measured with metline, skinfold caliper, and sliding caliper.

Results: Flexed arm girth tends to increase up to 0,75% (right) and 0,95% (left) in control group followed by 3,46% (right) and 3,65% (left) increase in treatment group. However there was no significant difference measured with the p value of 0,240 (right) and 0,424 (left) in conrol group, as well as 0,080 (right) and 0,075 (left) in treatment group. The average difference in the increase of flexed arm girth

in treatment group was bigger compared to the control group. However, no significant difference were measured with p value of 0,140 (right) and 0,178 (left). Arm muscle area in control group tends to decrease up to 1,82% with p value of 0,643 (right) and 1,52% with p value of 0,674 (left), while in treatment group there's a tendency of increased value up to 7,27% with p value of 0,223 (right) and 4,99% with p value of 0,474 (left). The average of arm muscle area difference tends to be bigger in the treatment group when compared to control group, however there was no significant difference among both group with p value of 0,195 (right) and 0,395 (right). Muscle percentages for control group show trends of decreased value for up to 0,48% (total), 0,5% (*trunk*), 0,75% (*arms*), and 0,32% (*legs*). No significant difference was measured with p value of 0,396 (total), 0,611 (*trunk*), 0,149 (*arms*), and 0,395 (*legs*). Muscle percentages for treatment group show no change in total muscle, as well as trends of decrease in *trunk* muscle for up to 0,3%, arms muscle for up to 0,4%, and legs muscle for up to 0,2%. No significant difference were measured, as shown by p values of 0,963 (total), 0,815 (*trunk*), 0,271 (*arms*), and 0,709 (*legs*). There was no significant difference between both group as shown by p value of 0,65 (total), 0,94 (*trunk*), 0,29 (*arms*), and 0,84 (*legs*). Fat percentages in control group show decreased value for up to 4,96% (total subcutaneous), increased value for up to 0,2% (*trunk*), 5,6% (*arms*), and decreased value as much as 1,2% in legs. No significant difference was measured in all areas, as shown by p values of 0,21 (total subcutaneous), 0,90 (*trunk*), 0,47 (*arms*), and 0,72 (*legs*). Fat percentages in treatment group were decreased for as much as 7,39% (total subcutaneous), increased for as much as 0,68% (*trunk*), 2,7% (*arms*), and 0,1% (*legs*). There was no significant difference measured on all area, as shown by p value of 0,40 (total subcutaneous), 0,87 (*trunk*), 0,63 (*arms*), and 0,97 (*legs*). No significant difference were measured in the delta of fat percentage, between control group and treatment group, shown by p value of 0,74 (total subcutaneous), 0,96 (*trunk*), 0,78 (*arms*), 0,81 (*legs*). Mesomorph somatotype in control group didn't change, however endomorph value was increased for as much as 8,8%, as well as ectomorph for up to 4%. No significant difference was measured in control group, as shown by p value of 0,360 (endomorph), 0,673 (mesomorph), and 0,822 (ectomorph). In the treatment group, mesomorph was decreased for as much as 2,1%, endomorph was increased for as much as 13,5%, while ectomorph was increased as much as 18%. No significant difference was measured in treatment group, as shown by p value of 0,254 (endomorph), 0,822 (mesomorph), and 0,164 (ectomorph). The differences between the two groups tend to increase, mesomorph was increased in control group and decreased in treatment group, ectomorph tends to decrease in control group and increase in treatment group. No significant difference was measured between the two groups with p values of 0,707 (endomorph), 0,689 (mesomorph), and 0,063 (ectomorph).

Kesimpulan: There were no significant differences in flexed arm girth, arm muscle area, muscle percentage, fat percentage, and somatotype value, before and after weight training period in group administered with regular sponge cake. There were

no significant differences in flexed arm girth, arm muscle area, muscle percentage, fat percentage, and somatotype values, before and after weight training period in group administered with KACIDE sponge cake. No significant differences were measured in the delta of flexed arm girth, arm muscle area, muscle percentage, fat percentage, and somatotype value, before and after weight training period between group administered with regular sponge cake and group administered with KACIDE sponge cake.

Keywords: BCAA, branched chain amino acids, weight training, muscle formation, flexed arm girth, arm muscle area, muscle percentage, fat percentage.

-
1. Undergraduate student of department of Health Nutrition Faculty of Medicine Gadjah Mada University
 2. Department of Health Nutrition Faculty of Medicine Gadjah Mada University