

# A Cohort Study on the Influence of Beta-Alanine Supplementation on Cycling Power Output Using Random Effects Modeling

Yeliz Kahraman\*

Department of Science, Health Science Institute, University of Akdeniz, Turkey

## ABSTRACT

Supplement the use of ergogenic aids in cyclists directly has been improved the body metabolism and hemodynamic factors. Mostly knowing that, muscle power development progressive fast glycolytic and short time oxidative systems reactions. Sport competition intervals, therefore, during periods has been used specific drinks supported to cyclists. But, be obtained during should be long race times. Athletes directly needed some drug and fluid intake to prevent from metabolic breakdown rapidly the dynamic physiologic performance factors. Beta-alanine supplementation can be direct muscle performance development affects the anaerobic metabolism and capacity. It should be determined how the cyclists will use the competitive and training period intervals can increase the cyclist's specific sprint and endurance race performance. Science cyclist International Road doses will be created in which, intervals can randomly effectively investigate. This study random cohort study is examined the effects of beta-alanine supplementation on aerobic and anaerobic power output in specific cyclists. Therefore, we have been databases PubMed, Scopus, and Medline initial search 10 August 2020 were created prospective effect the quality of bias work concluded effect size (ES) 95% confidence interval (CI) were used in the participant. Participants (N=66) have an age range of 25 to 38 of the using beta-alanine in training periods to endurance muscle performance, aerobic power, anaerobic power, and sprint time trials. As a result of beta-alanine improved anaerobic and aerobic power output on 4-week time dependent trial performance condition. Significant values are obtained level factor  $\alpha < 0.05$  and p-value analysis pre-post interactive standardization.

**Keywords:** Beta-alanine; Supplementation; Nutrition; Aerobic; Anaerobic performance

## INTRODUCTION

Application in micro-nutrition a current approach in sports science and competitive-training periodization additional international road cyclists has been obtained micro ingestion form of diet is use increase daily their consumption [1]. Additional macronutrition requirement in standard nutritional content needed are calories taken daily should be substances same time pre-training and competition and post-training and competition of the cyclists help to performance factors and muscle recovery [2]. The cyclists use ergogenic aids to conjunction their performance power output, stroke volume therefore, generally not complete diet [3,4]. Increased energy formation of the muscle performance period according to like

vitamin and mineral occurs ergogenic aid from same excessive obtain long period training or competitive that macronutrition ingestion requirement [5]. Recruitment by Canada Academy of Sports and American School of Sports Medicine as suggested is three ergogenic aids class recommendation which, including a have many benefits such as completing reduce metabolism or super composing exercise in beta-alanine has been the groups of cyclists [6].

It is possible to see the different time combined to preserve optimal maintain performance when considering cyclists, it is important during long race times occur nutrition intake. Accordingly, groups of cyclists it is diets that will conjunction performance while consuming ergogenic supplement turned have efficiency in superior development of endurance and

\*Correspondence to: Yeliz Kahraman, Department of Science, Health Science Institute, University of Akdeniz, Turkey, Tel: 905428227162; E-mail: yelizkahramana@hotmail.com

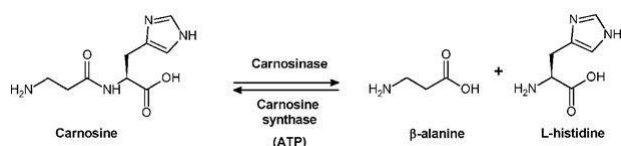
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strength component Cycling sports is continued the hard fight with endurance and muscle strength performance and recovery expected to take place in short periods. Condition competitions are observed in different stages and time trials over exceedingly long periods so basically is the sport of endurance [7-9]. But sprint performance for nature have explosive in short periods [10]. Athletes sometimes some had difficulty feeding depending on time are very hungry therefore, diet control and nutrition programs should be planned closely carefully in appropriate training processes as team and coach [11]. Dynamic performance over long period's peak values occur during the rapid recovery and stroke volume when power different metabolism is achieved in blood lactate optimal intervals.

Previous exercise and performance studies for use of beta-alanine into carnosine conjunction is aim in specific type II fibers reported that an amino acid this inductively of hydrogen ions (Figure 1).



**Figure 1:** Complex carnosine-L-histidine metabolism of rapid insulin and glycolytic energy formation in muscle performance development optimal endurance sequences.

Without being induced calcium release simultaneous performed ATP-resentez in the anaerobic glycolysis cycle. But this condition metabolic cycle fast recovery energy in cytoplasm can help to muscle buffering observed intramuscular adaptation pH buffering as regeneration activity on muscle development performance. Investigation reported on the horses initial beta-alanine amino acid form for the metabolic carnosine type I oxidative 20% and type II b fast glycolytic fibers 46% has become evident not type IIa fast glycolytic oxidative. Therefore, developing cycling increase energy formation drug studies firstly have been a multiple antioxidant. Stunning results, using to beta-alanine supplementation highly ingestion in the decade >4 weeks 3-6 g/day ingestion resulted in intramuscular carnosine levels within type I and type II fibers 30-80% same performance results all during competitive and training doses. Addition, intramuscular recover phase and anaerobic capacity development levels of the muscle mass between male and female 3.5-1.0 ratio in hormonal development residual sex are observed to sytokinease. Same previous studies how exercise performance

outputs development of endurance cyclists has not gained obvious as long time- dependent performance. The reason this, in endurance performance is by tolerating rapid glycolytic energy capacities involved in the oxygen cycle over 1-3 min for performance the use of beta-alanine in the few minutes should be used as an auxiliary production. Although, cyclist's group has been reported to contractile mechanics oxidation of percentage reported to cause lactate in anaerobic and aerobic capacity. Increased lactate production has enabled muscle adaptation otherwise total work output capacity increase in bicycle capacity was found to correlate with the carnosine content in muscle within beta-alanine by 50% type I and type II. The muscular efficient of knee and ankle limbs extensor for anaerobic capacity and aerob power output variables is important muscle development in cyclist period and pedalling mechanic.

The aim of this study was to conclude the use of beta-alanine dose in the physiologic effect depend on time-related trials of anaerob and aerob power output performance in cyclists. Dose use in different time periods will be concluded at performance factor (e.g., as performance output glycolytic insulin resistive factor and aerobic residual oxygen capacity).

## MATERIAL AND METHODS

This study was followed methodological quality and bias of include by independent effect size and confidence interval investigate the applied training science PubMed, Google Scholar and Medline were data publication no limitation. The Cochrane Collaboration quality controversies resolved on blind evaluated of the study author, method, and characteristics sample size, using of the beta-alanine supplement and performance levels of cyclists. Same dose using was formed. All screen evaluation generally eligibility criteria completed the study characteristics; a: participation property characteristics, b: health hydration status, core temperature used to during supplement, c: macro-nutrition standardizes before and after training and competitive period of their performance anaerobic and aerobic power output recorded. All statistic paired-T test comparison to between cyclist pre and post values, method Binary R statistics measurement therefore, mean and standard deviation operation systems windows and excel statistically significant was set the effect size and are obtained to use the measurement confidence interval low and high showed Cohen'd effect size 0.20 small, 0.50 medium, 0.80 high this study (SPSS 21, IBM, New York, USA; Salkind, 2010). ( $P < 0.05$ ) (Table 1).

Variable criteria	Included	Excluded
Participation	25 to 38 age and medical health acceptable	38 adult and cyclist age no cyclists e.g., road, mountain, recreational
Method approach	Beta-alanine blind manner and macro-micro specific nutrition intake standardization	Intake caffeine, alcohol before periodization and training times and no Nutrition program cyclist.
Studies design	Randomize and cohort single- and double-blind studies	No randomize experimental condition nutrition intake

Results	Aerobic and anaerobic power output at least performance parameter	Aerob and anaerob power output no results and conclusion eligibility
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**Table 1:** Criteria of the research eligibility.

## RESULTS

Participations results obtained PubMed (N=26), Scopus (N=74) and Google Scholar (N=56) total 156 research. Research data variables each statistically significant end of mean and standard error and deviation resulted random effect size estimated in effectively weighted mean difference and 95% confidence interval. Therefore, individual results population sample size as minus standardized. Sub-results analysis into training protocols, strength and endurance, sprint and combined power output was prevented from of the bias in study specific development should be sport science and international cyclist's performance could determine and evaluate.

Participation risk of bias in blind author evaluated references listed. This study prospered range randomize allocation concealment; blind participation, blinding of outcome evaluate, incomplete outcome data, selective outcome reporting, other sources of bias, overall risk of bias; 2 low, 3 medium, 4 high-risk bias was evaluated as quality Cochrane.

BA supplements most anaerobic glycolytic systems when performance factors can be effect from glycolytic systems energy output and muscle performance energy. Therefore, anaerobic, and aerobic protocols by different time periods resulted in endurance and recovery of the power performance mechanics and pedaling development. However, their acute effect was aimed. Same participation groups regardless of experience characteristics aerobic power has been limited long time periods. Anaerobic power reported that, time as periods to measurement protocols are values parameter obtainment eligibility power output reference. Therefore, races cycling time-period anaerobic less were founded. Reported that the most should focus on power performance changes or not. Systematic values of obtain graph presentation for not significant included in study. Peak training period and peak power development out exercise trial and test condition generally use of BA supplement has been concluded.

Bellinger and Minahan in cyclists for sprint performance depending on race starting 41 km repetitions to interval training session and 4 km and 10 km performed three times in supramaximal exercise section. Normalize power founded that, research to km 144.84/Watt conjunction with 1.90 mmol lactate accumulation. The resulted values showed that, 3-4 km has obtained 424/Watt to increased anaerobic improvement concluded (ES=0.29 moderate, WMD=23/Watt; p=0.05) as statistical high effective shown. Lactate mmol levels same mean 16.1 mmol totally significant has shown highly effective lactate power energy increase. Power increase daily progressive contraction of muscle mass as 6.4 g are beta-alanine group's cyclists lactate elimination resulted. Howe et al. supramaximal effort 90% reach contraction concentric after HIT-30 s at 4-min mean reported that, results showed total working aerobic power

optimal stroke volume/saturation and lactate elimination increase, proved recorded blood resistance, muscle heat and core temperature optimal endurance development of muscle contraction sizes effected performance development (ES=0.27 moderate; WMD=11/Watt; p=0.01) of the showing muscle strain increase resulted to the vastus lateralis and medialis and rectus femoris and gastrocnemius sec has been shown statistical significant with 30 s isokinetic test conclusion time-depend specific protocol increased aimed lactate [10]. However, power output after 4-weeks beta-alanine using was increased. Other studies for peak performance development 90% MSSL 110-min after 10-min time trial functional threshold power sessions and 50% MSSL 30-s sprint time performance determined BA groups cyclists at 10-min time trial and sequence should be aerobic power differ was effect decrease has been showed (ES=0.50 moderate; WMD: 52/Watt; ES=0.54 moderate; WMD: 21/Watt; p=0.03). Therefore, consequently, lactate evaluated finish the power output, overall effect size was taken for level alpha p>0.05. Additional within research different testing condition peak power values size has been shown alpha level p<0.05.

## DICUSSION

Over long time periods, it is believed that it can increase the effect of international road cyclist training of anaerobic and aerobic high effect time 1-day micro cycle anaerobic threshold but long-term efficiency as 4 to 8-week same periodization because estimated to power and lactate mmol increase. Male cyclist at least per week 7 hours training about 20 km trial load is occur 7/Watt power increase sequence of intervals but increasing mechanism in the muscle would not proper training into beta-alanine use because 48 hours or 24 hours eliminated lactate as well as recovery most speed. Beta-alanine individual dose prevent from lactate decreased must be macro carbonhidrate if use decreased; short concentric activation did not formation. Limitation must be their insulin pooled mmol ATP glycogen. Chung other studies as 1-hour working of muscle using beta-alanine time interval total 101 km road with gastronomes and soleus when carnosine with macronutrition level investigated the mean development obtained 20/Watt, similarly total load means caused 1.987 J power. However, BA group were not randomized because there was only indicating training effectiveness. High total work in this study 6-week BA using for intramuscular hypertrophy level can show regardless of muscular economy at rate of buffering fast glycolytic sprint performance peak power increase for trials 4 × 30 wingate performance. Aerobic capacity regardless initial load 120% of VO<sub>2</sub> max in voluntary exhaustion of female cyclist 24% increase with training effectiveness low about lactate 5.76 mmol high intensity trial resulting of was obtained aerobic capacity 34% distal end volume increase anaerobic is noteworthy. Using of BA one day 1 gr non- contribution to performance improvement of muscle size contraction phases. This stage short term and mean 55/Watt no significant that, evidence fatigue in post

measurement accompanied to lactate accumulation 14.6 mmol as other reported high. Other BA supplements anaerobic isokinetic above 1 min time dependent contractile mechanism the type II fibers occurred 41 J total working no considered imported difference protocol time dependent 4000 m aerob performance but anaerob power high observed while increased 12.6 fatigue mmol lactate hgmm of stroke volume characteristic, limitation of working mean and standard deviation values was not specified.

After all, critical power has not been formed with BA-alanine using and carbohydrate consumption short term 2-4 week can support as well as physiologic using no assumption ergogenic aid the short period competition and training times. In long term aerobic working modes for endurance cyclists should be macro-nutrition intake side effect paresthesia should not be overlooked. Additional, total sprint supramaximal intensity compromise high capacity normalize power effort of short-work attribute mean age 24 and 28-day-6.4 g/day intake with recovery and injury risk of sportmenships. For muscular efficient increase depending on the sprint performance protocols above ventilator threshold should be BA supplements need to long-term showing effective training periods and 25 year and 8-week/800 mg.

Therefore, fast contraction period 180-degree repetition 30 mechanics muscular efficient use of BA supplements in cyclists increased in performance their concluded age 27 and 4-week/127.4 g, short-term muscular efficient performance power output shown is effect supplements in cyclist but periodization for long term strategies more effect is needed professional and international road cyclist.

## CONCLUSION

In race and competition cyclist anaerob and aerob power the BA supplements exercise finalized protocol supplements doses. Peak races sprint exercise and training for reason should be true using limitation, therefore, long term periods BA supplements few research have been obtained. Peak BA included in muscle buffering strategies within 90-min. Power factors when anaerob and aerob working capacity in future research for power output should lead to the linear effect and training period planning that may result in power out, lactate or hemodynamic parameter. Side effect factors another supplement combine or carbohydrate status individual cyclists or team road cyclist's implementation are needed for develop. Limitation dose setting

should be created according to athletes. Muscle mass and fatigue be limited in multiple energy sections.

## CONFLICTS OF INTEREST

None.

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