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**Meta-Title: The Science Behind Pre-Workout Supplements**

**Meta-Description:** The pre-workouts are dietary formulas containing ingredients such as caffeine, L-citrulline, creatine, beta-alanine, betaine, alpha GPC, and BCAAs that boost your energy and athletic performance.

## **The Science Behind Pre-Workout Supplements**



<https://www.mensjournal.com/health-fitness/best-pre-workout-supplements/>

If you have a workout routine, it's natural to take a pre-workout drink before leaving for the gym. Many professional athletes and trainers have incorporated pre-workout supplements into their daily fitness routine. After being inspired by them, fitness enthusiasts have also started taking these energy drinks.

However, very few have an idea of how pre-workout supplements work. To learn how you can maximize your gains by including a pre-workout supplement to your fitness regime, you must understand the science behind it.

This article discusses what a pre-workout supplement is, how does it work, its ingredients, and its side effects.

## What is Pre-Workout?

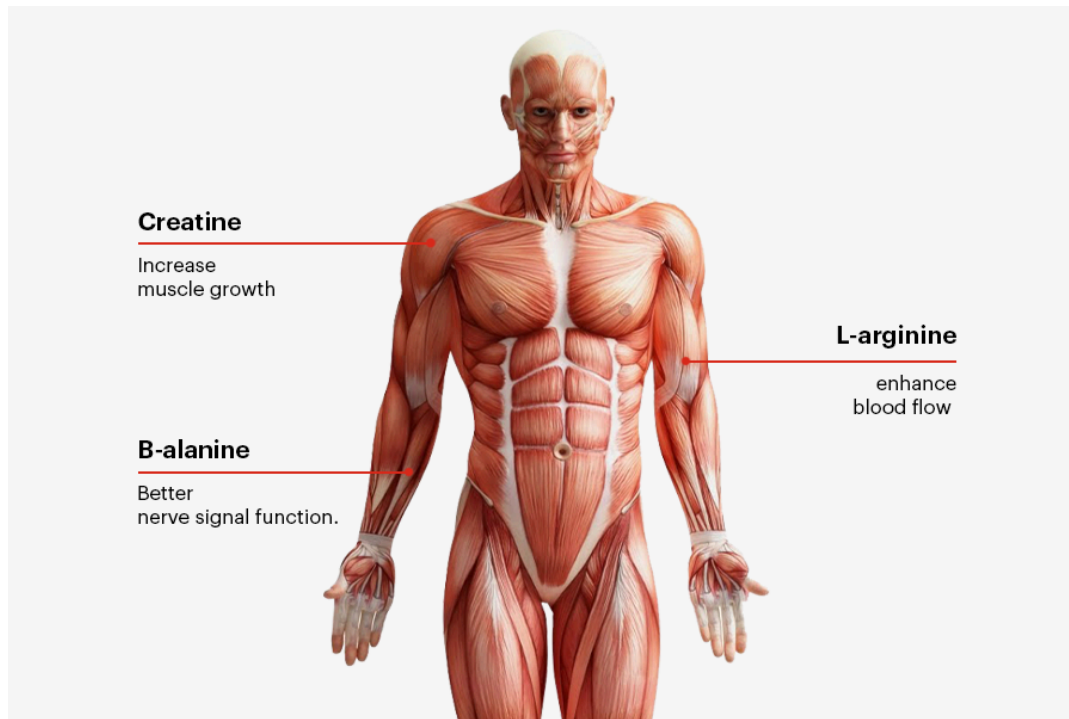


<https://www.dmoose.com/products/pre-workout-energy-powder>

Pre-workout supplements, also known as pre-workouts, are dietary formulas specifically designed for boosting your energy and exercise performance. They are usually powdered forms that you can consume by mixing them in your drink before starting your workout.

While there are various formulas for pre-workouts, some of the common ingredients in a pre-workout supplement include caffeine, creatine, L-citrulline, beta-alanine, betaine, and artificial sweetener. However, their consistency and quantity may vary depending on the brand you choose.

## How Do Pre-Workouts Work?



The combination of ingredients in a pre-workout provides your body all the energy it needs to get through an intense workout. However, the main ingredient that optimizes your exercise performance is caffeine.

The caffeine in the pre-workout supplement [minimizes fatigue](#) and enhances your overall anaerobic performance. It makes you feel stronger and increases your stamina.

Even a small amount of caffeine can boost your energy levels, and help you lift heavy weights, and ace through a HIIT session. When combined with other ingredients like L-arginine, and B-alanine, caffeine makes pre-workouts the ultimate energy booster.

# What's in Pre-Workout?

<b>Supplement Facts</b>		
Serving Size: 23.5g One Rounded Scoop		
Servings Per Container: 20		
	Amount Per Serving	% DV
Calories	5	
Total Carbohydrate	2 g	< 1%
Dietary Fiber	< 1 g	3%
Magnesium	12 mg	3%
Sodium	80 mg	3%
Potassium	77 mg	2%
L-Citrulline	6000 mg	**
Creatine Monohydrate	3000 mg	**
Betaine Anhydrous	2500 mg	**
Arginine AKG	2000 mg	**
Taurine	2000 mg	**
Beta Alanine	2000 mg	**
L-Tyrosine	1000 mg	**
Alpha GPC 50%	600 mg	**
Electrolyte Blend	500 mg	**
Sodium Chloride, Potassium Citrate, Magnesium Citrate		
Caffeine	300 mg	**
Dynamine 40%	125 mg	**
Huperzine A (Huperzia serrata leaf standardized extract)	100 mcg	**
** Daily Value (DV) not established		

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Almost all reliable and scientifically validated pre-workout supplements consist of the following ingredients:

## 1. Caffeine

Caffeine is a powerful stimulant that is easily absorbed by your body. As it rapidly crosses your brain, it attaches itself to specific receptors, blocks adenosine and its mellowing effects. In short, a caffeinated brain is filled with adrenaline and noradrenaline, which produces energy.

In addition, caffeine also blocks phosphodiesterase (PDE). PDE breaks down cyclic adenosine monophosphate (cAM), a signaling molecule. As caffeine blocks PDE, the cAM levels build up and intensify the energizing impacts of adrenaline and noradrenaline.

According to a [research study](#), caffeine in pre-workout supplements plays a significant role in lowering perceived exertion and reducing muscle fatigue during exercise. It also facilitates recovery and delays [muscle soreness](#). As a result, caffeine helps increase the workout intensity and provides enhanced gains within a limited time.

## **2. Creatine**

Creatine is a chemical compound that your body produces naturally. It is mainly stored in the skeletal muscle, where it plays an essential role in producing energy and increasing muscular strength.

While it is mostly an important ingredient in a pre-workout supplement, it is also sold separately. It is quite famous among bodybuilders, weightlifters, and power athletes as it maximizes workout performance.

According to a [study](#), supplementing with creatine helps maximize your body's supply of this compound; thereby, improving your recovery time, exercise performance, and mass strength.

## **3. L-Citrulline**

L-citrulline, along with L-arginine and dietary nitrates such as beetroot juice, is the important compound your body utilizes to produce nitric oxide. Nitric oxide is a compound that helps relax blood vessels and improve blood flow.

[Studies suggest](#) that supplementing with L-citrulline, L-arginine, and similar compounds boosts oxygen and nutrient transportation to your muscles, thereby enhancing your athletic performance.

L-citrulline also helps prevent muscle fatigue and facilitates energy production by increasing the rate of ATP and phosphocreatine production. [Research also suggests](#) that citrulline used in the pre-workout supplement helps combat exercise fatigue and minimizes muscle soreness.

## **4. L-Arginine**

It is a precursor of nitric oxide that relaxes and dilates blood vessels, thereby allowing more nutrients to enter your muscles during workouts. It also reduces post-workout pain by producing natural analgesics in the body.

It supports muscle gain, enhances blood flow, and increases your strength.

## **5. Beta-Alanine**

Beta-alanine is another scientifically backed ingredient that has been shown to increase muscle carnosine levels. The enhanced muscle carnosine levels improve muscle energy and

endurance levels. [According to research](#), taking beta-alanine can help you push yourself harder and work out longer.

It is a precursor to carnosine, allowing the muscles to contract longer, delaying muscle fatigue. The greater workout intensity and volume will help you maximize your gains.

## **6. Branched-Chain Amino Acids (BCAAs)**

The BCAAs such as leucine, isoleucine, and valine are primarily stored in your skeletal muscles, where they are used by your body to produce the energy needed for an intense workout.

[The blood leucine levels](#) have been shown to decline by about 30 percent while strength training and between 11 to 33 percent during fat-burning cardio sessions. Supplementing with pre-workouts containing BCAAs can help you restore the leucine levels your body needs to generate energy.

[According to research](#), elevated blood BCAAs after consuming pre-workout drinks help reduce fatigue and perceived exertion, motivating you to push yourself harder, especially during an intense training session.

## **7. Betaine**

Betaine is yet another wonder ingredient included in a pre-workout powder that [promotes muscle protein synthesis](#) and lowers homocysteine levels. It helps increase strength and muscle mass, speeds up recovery time, and reduces after-workout pain.

It also helps regulate the water balance and promote cell hydration and membrane stability.

## **8. Alpha GPC**

It is a cholinergic compound that enhances acetylcholine production. Acetylcholine boosts cognitive function and promotes physical and mental stamina. Besides, it plays an important role in delivering nutrients to the muscles during a workout to ensure strength and muscular endurance.

Now that you are aware of the ingredients used in pre-workout supplements, and their benefits on your performance, you should also learn about the common side-effects of pre-workout supplementation, as discussed in the next section.

# Is Pre-Workout Bad?



<https://www.brisbanebulkbillingdoctor.com.au/news/whats-the-difference-between-fear-and-anxiety/>

While pre-workout supplements are usually safe, they are not completely risk-free. Before you decide to include them in your workout routine, be aware of their potential side effects.

## 1. Risk of Excessive Caffeine Consumption

The main energy-boosting ingredient of the majority of a pre-workout supplement is caffeine. [According to research](#), excessive caffeine intake can increase blood pressure, anxiety, and disturbed sleep patterns.

Most pre-workout drinks contain as much caffeine as you would intake by one to two cups of coffee. However, if you are consuming this compound from other sources, too, you might end up facing the side effects of excessive caffeine consumption.

## 2. Discomfort Caused by Artificial Sweeteners and Sugar Alcohols

Most energy boosters contain artificial sweeteners or sugar alcohols for enhancing flavor without adding calories. However, some sweeteners may result in a general feeling of discomfort and intestinal distress.

[Research suggests](#) that a high intake of sugar alcohols may also cause bloating, diarrhea, and gas, which can end up disrupting your workout routine. To be on the safe side, avoid choosing a



pre-workout energy supplement containing a large number of artificial sweeteners and sugar alcohols, or try a small amount to see how well you can tolerate it.

### 3. Compromised Quality

Some dietary supplements are not scientifically validated and regulated by the authorities. Even their product labeling may be misleading or inaccurate. In case the supplements' quality and safety are compromised, you may end up consuming toxic substances.

To ensure your safety, buy pre-workout supplements that a third party has validated.

## Which Pre-Workout Supplement Should I Choose?



<https://www.dmoose.com/products/pre-workout-energy-powder>

As discussed in the previous section, to maximize your gains, and minimize the chances of side effects, you must opt for a pre-workout supplement that contains reliable ingredients and is scientifically validated.

It would be best to thoroughly check the labeling and ingredients before finalizing the pre-workout energy drink you want to invest in.



DMOOSE Pre-workout powder is an amazing option that you can choose. The energy booster increases your workout intensity, enhances your strength, boosts blood circulation, fights off mental fatigue, and speeds up recovery.

Besides, it contains all the major ingredients mentioned above that will help you maximize your gain by providing the energy you need during an intense workout session. It also increases your focus and concentration before the workout, preparing you to give your best and push yourself harder, especially during a physically challenging workout session.

The pre-workout supplement contains 300 mg caffeine, 3 g creatine, 6 g L-citrulline, 2 g L-arginine, 2 g beta-alanine, 2.5 betaine anhydrous, and 600 mg alpha GPC, the benefits of which are already covered in detail.

In addition to these major ingredients, the pre-workout drink 2 g taurine, an antioxidant that ensures brain health, boosts energy levels, especially for intense workouts. Moreover, it improves blood flow, hence, supporting healthy heart functions and faster recovery.

The pre-workout for men also contains 1 g of L-tyrosine, an amino acid that releases norepinephrine, a chemical that helps keep you alert and focused during workouts. It promotes energy production by working as a precursor of dopamine and epinephrine.

What makes the workout powder the best choice is a full dose of electrolyte blend containing magnesium, sodium, calcium, and chloride that helps you recover from the workout by replacing the fluids and nutrients that you lose during training. The electrolytes regulate acid and alkaline balance in the body, thereby ensuring better athletic performance.

## **Takeaway**

The pre-workout supplements are dietary formulas designed for boosting your exercise performance and energy. The pre-workout drinks consist of energy-boosting ingredients such as caffeine, creatine, L-citrulline, beta-alanine, betaine, and Alpha GPC.

However, it can also result in some side effects caused due to excessive consumption of caffeine, artificial sweeteners, sugar alcohols, or compromised quality.

To maximize the gains from taking a pre-workout supplement, you must choose the energy booster validated by a third party, containing the reliable and authentic ingredients discussed in this article. It would be best if you do not consume more than the recommended dosage.

## References

- Bailey, Stephen J., et al. "L-Citrulline Supplementation Improves O<sub>2</sub> Uptake Kinetics and High-Intensity Exercise Performance in Humans." *Journal of Applied Physiology (Bethesda, Md.: 1985)*, vol. 119, no. 4, Aug. 2015, pp. 385–95. *PubMed*, <https://doi.org/10.1152/jappphysiol.00192.2014>.
- Bescós, Raúl, et al. "The Effect of Nitric-Oxide-Related Supplements on Human Performance." *Sports Medicine (Auckland, N.Z.)*, vol. 42, no. 2, Feb. 2012, pp. 99–117. *PubMed*, <https://doi.org/10.2165/11596860-000000000-00000>.
- Doherty, M., and P. M. Smith. "Effects of Caffeine Ingestion on Rating of Perceived Exertion during and after Exercise: A Meta-Analysis." *Scandinavian Journal of Medicine & Science in Sports*, vol. 15, no. 2, 2005, pp. 69–78. *Wiley Online Library*, <https://doi.org/10.1111/j.1600-0838.2005.00445.x>.
- Greer, Beau Kjerulf, et al. "Branched-Chain Amino Acid Supplementation Lowers Perceived Exertion but Does Not Affect Performance in Untrained Males." *Journal of Strength and Conditioning Research*, vol. 25, no. 2, Feb. 2011, pp. 539–44. *PubMed*, <https://doi.org/10.1519/JSC.0b013e3181bf443a>.
- Hobson, R. M., et al. "Effects of  $\beta$ -Alanine Supplementation on Exercise Performance: A Meta-Analysis." *Amino Acids*, vol. 43, no. 1, July 2012, pp. 25–37. *Springer Link*, <https://doi.org/10.1007/s00726-011-1200-z>.
- Hurley, Caitlin F., et al. "The Effect of Caffeine Ingestion on Delayed Onset Muscle Soreness." *Journal of Strength and Conditioning Research*, vol. 27, no. 11, Nov. 2013, pp. 3101–09. *PubMed*, <https://doi.org/10.1519/JSC.0b013e3182a99477>.
- Kreider, Richard B., et al. "International Society of Sports Nutrition Position Stand: Safety and Efficacy of Creatine Supplementation in Exercise, Sport, and Medicine." *Journal of the*

*International Society of Sports Nutrition*, vol. 14, 2017, p. 18. *PubMed*, <https://doi.org/10.1186/s12970-017-0173-z>.

- Mäkinen, Kauko K. "Gastrointestinal Disturbances Associated with the Consumption of Sugar Alcohols with Special Consideration of Xylitol: Scientific Review and Instructions for Dentists and Other Health-Care Professionals." *International Journal of Dentistry*, vol. 2016, 2016, p. 5967907. *PubMed*, <https://doi.org/10.1155/2016/5967907>.
- Martinez, Nic, et al. "The Effect of Acute Pre-Workout Supplementation on Power and Strength Performance." *Journal of the International Society of Sports Nutrition*, vol. 13, no. 1, July 2016, p. 29. *Springer Link*, <https://doi.org/10.1186/s12970-016-0138-7>.
- Mero, Antti. "Leucine Supplementation and Intensive Training." *Sports Medicine*, vol. 27, no. 6, June 1999, pp. 347–58. *Springer Link*, <https://doi.org/10.2165/00007256-199927060-00001>.
- Olthof, M. R., and P. Verhoef. "Effects of Betaine Intake on Plasma Homocysteine Concentrations and Consequences for Health." *Current Drug Metabolism*, vol. 6, no. 1, Feb. 2005, pp. 15–22. *PubMed*, <https://doi.org/10.2174/1389200052997366>.
- Temple, Jennifer L., et al. "The Safety of Ingested Caffeine: A Comprehensive Review." *Frontiers in Psychiatry*, vol. 8, 2017, p. 80. *PubMed*, <https://doi.org/10.3389/fpsy.2017.00080>.