*ejpmr, 2018,5(02), 534-536*

**SJIF Impact Factor 4.161**

**EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH**

www.ejpmr.com

**Review Article**

**ISSN 2394-3211**

**EJPMR**

# A REVIEW ON "TAURINE-A MAGIC MOLECULE"

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**Article Received on 23/12/2017** **Article Revised on 12/01/2018** **Article Accepted on 01/02/2018**

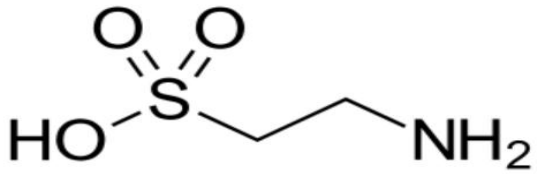
## ABSTRACT

Taurine is an amino sulfonic acid, but it is often referred to as an amino acid, a chemical that is a required building block of protein. Taurine is found in large amounts in the brain, retina, heart, and blood cells called platelets. The best food sources are meat and fish.An eye disease called age-related macular degeneration. Early research suggests that taking a nutritional supplement containing taurine by mouth, in addition to standard care for 6 months, improves vision in people with AMD. Nausea and vomiting due to chemotherapy. Early research suggests that taking taurine by mouth improves the symptoms of nausea in vomiting in patients receiving chemotherapy. Cystic fibrosis. Taurine supplementation might be useful along with usual treatment to reduce fatty stools (steatorrhea) in children with cystic fibrosis. However, it does not seem to improve growth, lung function, or other symptoms of cystic fibrosis.Diabetes. Early research suggests that taking 1.5 grams of taurine twice daily for 4 months does not affect blood sugar, blood fats, or insulin levels in people with diabetes. Fatigue. Early research suggests that taking an energy drink containing taurine prior to driving may reduce driver fatigue. Exercise performance. Research suggests that taking 1-1.66 grams of taurine before exercise does not improve overall exercise performance. Using products containing taurine combined with other ingredients might improve cycling performance but not strength training or sprint performance.Stomach ulcers caused by Helicobacter pylori (H pylori) infection. Early research suggest that taking 500 mg of taurine twice daily together with conventional treatments for 6 weeks reduces H. pylori infection and improves ulcer healing. High blood pressure. Early research suggests that taking 6 grams of taurine daily for 7 days reduces blood pressure in people with borderline high blood pressure. Anemia due to iron deficiency. Early research suggests that taking iron with 1000 mg of taurine improves red blood cell counts and iron levels in women with anemia due to iron deficiency. Mental performance. Early clinical research suggests that taurine, in combination with caffeine and B vitamins, can improve attention and reasoning in adolescents, but does not improve memory.Muscle soreness. Research suggests that taking 2 grams of taurine together with branched chain amino acids (BCAAs) three times daily for 2 weeks reduces muscle soreness in healthy people who do not exercise regularly. Inherited muscle wasting disease (myotonic dystrophy). Early research suggests that taking100-150 mg/kg of taurine for 6 months improves the ability to relax muscles after use in people with myotonic dystrophy. Lack of sleep. Early research suggests that taking taurine plus caffeine or a combination product containing taurine, caffeine, and B vitamins reduces sleepiness and improves reaction time in people who are sleep deprived.

**KEYWORDS:** amino sulfonic acid, cystic fibrosis, myotonic dystrophy,neuroprotection, seizures, anti aggressive, thermoregulation, retinal protection, anti-inflammatory.

## Manuscript

Taurine, 2-aminoethanesulfonic acid, is an organic compound that is widely distributed in animal tissues.[1] It is a major constituent of bile and can be found in the large intestine, and accounts for up to 0.1% of total human body weight. Taurine has many fundamental biological roles, such as conjugation of bile acids, antioxidation, osmoregulation, membrane stabilization, and modulation of calcium signaling. It is essential for cardiovascular function, and development and function of skeletal muscle, the retina, and the central nervous system. Taurine is unusual among biological molecules in being a sulfonic acid, while the vast majority of biologically occurring acids contain the more weakly acidic carboxyl group. While taurine is sometimes called an amino acid, and indeed is an acid containing an amino group, it is not an amino acid in the usual biochemical meaning of the term, which refers to compounds containing both an amino and a carboxyl group.[2]

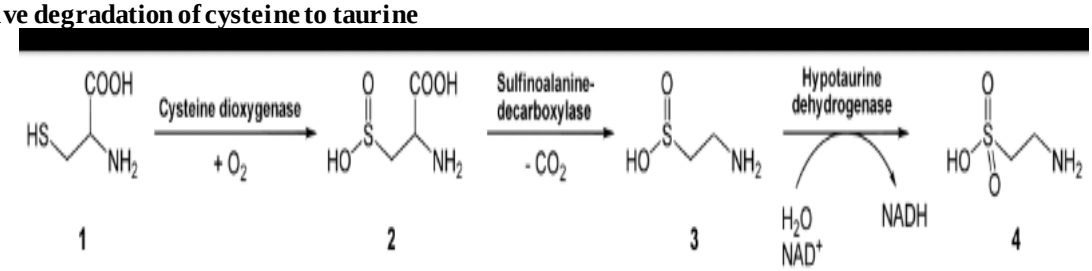


2-aminoethanesulfonic acid
Chemical formula C2H7NO3S
Molar mass 125.14 g/mol
Density 1.734 g/cm3 (at −173.15 °C), Melting point 305.11 °C (581.20 °F; 578.26 K)
Acidity (pKa) <0, 9.06
Taurine is named after the Latin taurus (a cognate of the Greek ταῦρος) which means bull or ox, as it was first isolated from ox bile in 1827 by German scientists Friedrich Tiedemann and Leopold Gmelin.[3]

**Biosynthesis**

Taurine is derived from cysteine. Mammalian taurine synthesis occurs in the pancreas via the cysteine sulfinic acid pathway. In this pathway, cysteine is first oxidized to its sulfinic acid, catalyzed by the enzyme cysteine dioxygenase. Cysteine sulfinic acid, in turn, is decarboxylated by sulfinoalanine decarboxylase to form hypotaurine. Hypotaurine is enzymatically oxidized to yield taurine by hypotaurine dehydrogenase.[4] Taurine is also produced by the transsulfuration pathway, which converts homocysteine into cystathionine. The cystathionine is then converted to hypotaurine by the sequential action of three enzymes: cystathionine gamma-lyase, cysteine dioxygenase, and cysteine sulfinic acid decarboxylase. Hypotaurine is then oxidized to taurine.

**Oxidative degradation of cysteine to taurine**




An important function of the β-amino acid, taurine, is the regulation of oxidative stress. However, taurine is neither a classical scavenger nor a regulator of the antioxidative defenses, leaving uncertain the mechanism underlying the antioxidant activity of taurine. In the present study, the taurine antagonist and taurine transport inhibitor, β-alanine, was used to examine the mechanism underlying the antioxidant activity of taurine. Exposure of isolated cardiomyocytes to medium containing β-alanine for a period of 48 h led to a 45% decrease in taurine content and an increase in mitochondrial oxidative stress, as evidenced by enhanced superoxide generation, the inactivation of the oxidant sensitive enzyme, aconitase, and the oxidation of glutathione. Associated with the increase in oxidative stress was a decline in electron transport activity, with the activities of respiratory chain complexes I and III declining 50-65% and oxygen consumption falling 30%. A reduction in respiratory chain activity coupled with an increase in oxidative stress is commonly caused by the development of a bottleneck in electron transport that leads to the diversion of electrons from the respiratory chain to the acceptor oxygen forming in the process superoxide. Because β-alanine exposure significantly reduces the levels of respiratory chain complex subunits, ND5 and ND6, the bottleneck in electron transport appears to be caused by impaired synthesis of key subunits of the electron transport chain complexes. Co-administration of taurine with β-alanine largely prevents the mitochondrial effects of β-alanine, but treatment of the cells with 5 mM taurine in the absence of β-alanine has no effect on the mitochondria, likely because taurine treatment has little effect on cellular taurine levels. Thus, taurine serves as a regulator of mitochondrial protein synthesis, thereby enhancing electron transport chain activity and protecting the mitochondria against excessive superoxide generation.[5] Taurine was first isolated from ox bile, and thus it's name is derived from the Latin 'Taurus', meaning 'ox' or 'bull'. Taurine is an amino acid and is present extensively in animal tissue. It is found in meat and fish, human tissue, large intestine and human breast milk. Taurine helps to improve blood pressure, cardiovascular function, retina, skeletal muscles. Taurine is usually added in energy drinks, infant formula, contact lens solutions, cosmetics.Yes, taurine is present in bullsperm but that is not it's source for energy drinks. Like many other additives, taurine too is synthesized in lab. It is manufactured by chemical synthesis in food processing lab.[6]

**Side effects of taurine**

main negative side effect associated with taurine supplementation is negative nitrogen balance. The University of Utah Health Care Center reports that consuming a single amino acid supplement like taurine can offset your natural nitrogen balance. This may lead to a decrease in your metabolic efficiency and a strain on your kidneys. Children taking taurine supplements may also experience stunted growth.[8]

## DRUG INTERACTIONS

Research into drug interactions with taurine is sparse and inconclusive, according to the University of California San Diego. Some research points to chemotherapy drugs like ciplatin and fluorouracil affecting how well your body absorbs taurine. Though the long term and drug contraindications for taurine are not well known, you should still speak to your physician about possible complications from taurine supplementation before taking products that contain the amino acid.[7]

### Why taurine is wonder molecule ?

Early research suggests that taking a nutritional supplement containing taurine by mouth, in addition to standard care for 6 months, improves vision in people with AMD. Nausea and vomiting due to chemotherapy. Early research suggests that taking taurine by mouth improves the symptoms of nausea in vomiting in patients receiving chemotherapy. Cystic fibrosis. Taurine supplementation might be useful along with usual treatment to reduce fatty stools (steatorrhea) in children with cystic fibrosis. However, it does not seem to improve growth, lung function, or other symptoms of cystic fibrosis.Diabetes. Early research suggests that taking 1.5 grams of taurine twice daily for 4 months does not affect blood sugar, blood fats, or insulin levels in people with diabetes. Fatigue. Early research suggests that taking an energy drink containing taurine prior to driving may reduce driver fatigue. Exercise performance. Research suggests that taking 1-1.66 grams of taurine before exercise does not improve overall exercise performance. Using products containing taurine combined with other ingredients might improve cycling performance but not strength training or sprint performance. Stomach ulcers caused by Helicobacter pylori (H pylori) infection. Early research suggest that taking 500 mg of taurine twice daily together with conventional treatments for 6 weeks reduces H. pylori infection and improves ulcer healing. High blood pressure. Early research suggests that taking 6 grams of taurine daily for 7 days reduces blood pressure in people with borderline high blood pressure. Anemia due to iron deficiency. Early research suggests that taking iron with 1000 mg of taurine improves red blood cell counts and iron levels in women with anemia due to iron deficiency. Mental performance. Early clinical research suggests that taurine, in combination with caffeine and B vitamins, can improve attention and reasoning in adolescents, but does not improve memory.Muscle soreness. Research suggests that taking 2 grams of taurine together with branched chain amino acids (BCAAs) three times daily for 2 weeks reduces muscle soreness in healthy people who do not exercise regularly.Inherited muscle wasting disease (myotonic dystrophy). Early research suggests that taking100-150 mg/kg of taurine for 6 months improves the ability to relax muscles after use in people with myotonic dystrophy.Lack of sleep. Early research suggests that taking taurine plus caffeine or a combination product containing taurine, caffeine, and B vitamins reduces sleepiness and improves reaction time in people who are sleep deprived.[9], [10]

## CONCLUSION

In the present review, attempts have been made to provide synopsis, synthesis and symbiosis of chemical and biological actions, which may provide future guidance and facilitate further research in this area. The successful journey of these analogues to clinical utility is a healthy and happy sign and an index of bright future, and we hope that this review will provide enough input to ignite the minds.

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