



A COMPREHENSIVE STUDY OF MURRAYA KOENIGII (LINN.) ON RESTORATION OF CONSCIOUSNESS BY AUGMENTING GLUCOSE UPTAKE IN THE NEURONS: A REVIEW

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ABSTRACT

Fainting, also known as syncope or passing out, is caused by decreased cerebral blood flow leading to loss of consciousness and muscle strength. It is caused by lack of blood supply to the brain leading to decrease blood sugar supply to the neurons. Symptoms like dizziness, sweating, pale complexion, blurred vision, nausea, vomiting or a warm feeling precede the loss of consciousness^[1]. For the brain, glucose serves as its main energy source. In order for glucose to be transported from the blood into the brain, it must pass through the endothelial cells that line the blood-brain barrier and enter the neurons and glia. These processes are mediated by facilitative Glucose transporter protein. *Kaidarya* is an Ayurvedic drug from the ancient *samhitas*, commonly known as curry leaves. Due to its *grahi* properties it increases the glucose uptake activity. When glucose uptake activity increases in the brain, it supplies sufficient glucose to the brain cells, which helps in management of fainting or syncope.

Keywords: Fainting, Glucose uptake, Grahi, Kaidarya, Syncope.

INTRODUCTION

Most people are aware of the concept of fainting, which is sometimes referred to blacking out, passing out. Actually, most individuals take fainting so easily that those who experience it frequently wait to seek medical assistance until after multiple episodes have happened.

Fainting medically known as syncope is a sudden loss of consciousness. At first, the affected person may experience lightheadedness or dizziness, as well as loss of hearing and vision. Other warning signs include rapid or irregular heartbeat, nausea, and perspiration.

However, some people, particularly the elderly, may lose recollection at the time of the faint and have no remembrance of warning symptoms. Dehydration, Anaemia, decrease blood flow to brain, decrease glucose supply to brain, heart or blood vessel related problems, blockage of blood vessels etc may leads to fainting.

In Ayurveda, syncope (fainting) can be explained in terms of *Murccha* due to the similarity in the pathology as well as clinical presentation.

GLUCOSE TRANSPORTER ISOFORMS:-

GLUT 1	RBC, Brain, Placenta
GLUT 2	Liver, beta-cells of pancreas, basolateral side of intestine.
GLUT 3	Brain, neurons.
GLUT 4	Adipose tissue, cardiac muscle, skeleton muscle.
GLUT 5	Testis, small intestine, helps in transport of fructose.
GLUT 6	Spleen.
GLUT 7	Liver (for the transport of GLU-6-phosphate.
GLUT 8	Blastocyst, insulin dependent.

Among them GLUT 1 and GLUT 3 are the main glucose transporters for the brain.

GLUT 1

Several GLUTs, or the family of hexose transporters are distributed throughout the mammalian body, including the brain. Among them GLUT 1 is found on both the luminal and abluminal sides of the blood brain barrier endothelium. The GLUT 1 isoform is the primary glucose transporter in blood brain barrier.

The main aim of this article is to find out the better source to manage fainting by augmenting glucose uptake activity which ultimately supplies sufficient glucose to the brain.

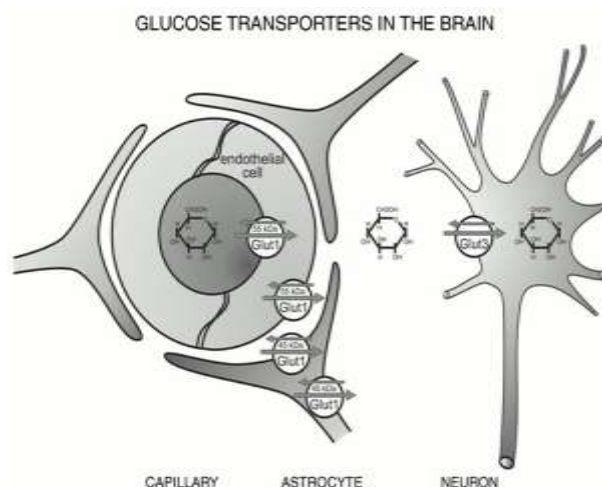
Glucose is the preferred fuel for all the mammalian cells. Glucose transporters promote its uptake into cells through osmosis. Thus, glucose transporters are found in all the membrane of all mammalian cells. The brain relies heavily on glucose from the bloodstream as its primary energy source. The blood brain barrier, made up of tight junctions between endothelial cells, allows glucose to be transported from the blood to the brain via endothelial cell membrane.^[2]

Glucose transporters are classified into two groups: Sodium dependent and the facilitative glucose transporter (sodium independent).

The sodium dependent isoforms regulate the transport of glucose against a concentration gradient. It exists in various tissues and organs but their presence in the brain has not been demonstrated conclusively. Whereas, facilitative glucose transporters, unlike sodium-dependent isoforms, can transport glucose along a pre-established concentration gradient.

GLUT 3

GLUT 3 is best known for particularly neuronal supply and it was previously referred to as the neuronal GLUT. GLUT 3 transporter is responsible for the uptake of D-glucose into neurons. The brain relies mainly in GLUT 3 for the glucose transport. The low Michaelis-Menten constant allows for continuous glucose delivery to neurons, even with low interstitial glucose concentration.



The present article is aimed to evaluate the glucose uptake activity of *Murraya koenigii*. This drug due to its *grahi* nature shows glucose uptake action.

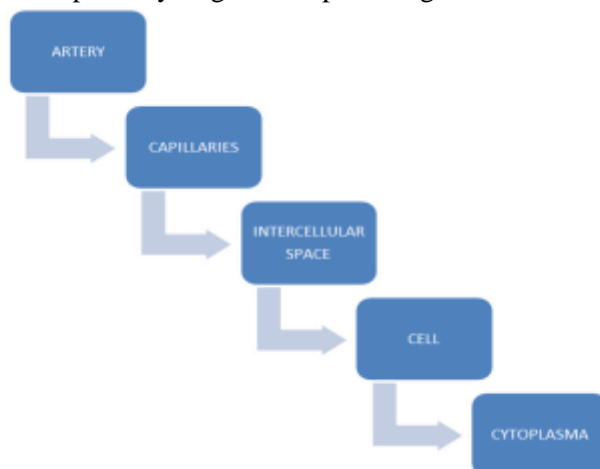
In Ayurveda, Glucose uptake can be correlated with *sangrahi karma*.

In *Sangrahi Dravya*, there is predominance of *vayu mahabhut*^[3]. These Dravya are *laghu, sheet, khar, Sukshma gunatmak, katu, tikta, Kashaya rasatmak, katu vipak, sheet virya* in nature and performs either by *achushan* (osmosis) or *anupravanta*(diffusion). Thus, they use the mechanism of osmosis or pressure/concentration gradient crossing to transport body fluids from higher concentration to lower concentration.

Murraya koenigii (Linn.) belongs to Rutaceae family, commonly known as curry leaves is a more or less

deciduous shrub or a small tree upto 6m in the height found throughout India up to an altitude of 1500m and are cultivated for its aromatic leaves. It possesses significant medicinal values and as well as used in traditional medicine. The plant is enriched with carbazole alkaloids such as Mahanine, Mahanimbicine, Mahanimbine and essential oil^[4]. The aerial part of *Murraya koenigii* has been prescribed for diabetes in ayurveda system of medicine. The crude leaf extract of *Murraya koenigii* was reported for its antioxidant^[5], antibacterial^[6], anti-inflammatory^[7] action. While studies have revealed the anti-diabetic property of *Murraya koenigii*.^{[8][9][10]}

In general, the pathway of glucose uptake is given in below flow chart



The leaves of *Murraya koenigii* takes up the glucose from the higher concentration that is from the plasma to the cell cytoplasm and sufficiently supplies it to the neurons where the concentration of glucose is lower.

As soon as the neurons receive the sufficient amount of glucose in the form of energy it starts functioning normally resulting in reversal of consciousness.

CONCLUSION

From the above discussion it can be concluded that the disorder of consciousness can be caused by various pathological conditions. The ayurvedic drug *Murraya koenigii* helps in the management of syncope by uptaking the glucose from the blood plasma to supply it to brain for its proper functioning which ultimately leads to restoration of consciousness. As well as the drug *Murraya koenigii* decreases the blood sugar level by the uptake of glucose from the blood plasma, thereby suggesting that the *Murraya koenigii* can be used for future research and evaluate its other activity.

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