Int. J. Sci. R. Tech., 2024 1(3)
A Multidisciplinary peer-reviewed Journal
www.ijsrtjournal.com [ISSN: 2394-7063]

Original Article

A Review on Vitamin B 17 (Amygdalin)

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ABSTRACT

Vitamin B17 is also known as Amygdalin. It is a naturally obtained in crystalline form and it has bitter taste. Vitamin B17 word derived from almonds because it is earlier extracted from Amygdala Amara in 1830. A theory by an ancient embryologist, John Beard, supports the fact that cancer is actually caused by the undesired and unpredicted growth of tumor cell which led to placenta beginning. Amygdalin has an inherent tendency to counter such malignant cells without harming normal cells. Another theory by Ernest T. Krebs Jr. claims that cancer is caused by the insufficiency of Vitamin B17. These theories are not confirmed but encompass a strong message that Vitamin B17/Amygdalin increased anti-cancer and therapeutic properties. Vitamin B17 benefits were well identified in ancient times also for treating various kinds of skin cancers. It was principally consumed by Egyptians and Chinese for therapeutic practices. Cancer cases are raising, and cancer is one of the main reasons for death in worldwide. There are number of evidence to support the idea that amygdalin can employ anticancer effects against lung, breast, prostate, colorectal, cervical, and gastrointestinal cancers. However, only a few studies have been accomplishing in vivo animal models, while clinical studies remain even more scarce. Amygdalin is an auspicious naturally occurring component that fights against cancer, it has anti-cancer properties have been scientifically proven from the last twenty years. Vitamin B 17 is present in the seeds of fruits in the Prunus rosaceae, also present in grasses, maize, sorghum, millet, cassava, apple seeds and many other foods.

Keywords: Amygdaline, Cancer, Toxicity.

INTRODUCTION

Amygdalin refers to a drug called laetrile, an artificial form of amygdalin. Amygdalin is a natural substance present in various nuts, plants, and fruit seeds. Although people often refer to B17 as a vitamin, this substance does not have approval Trusted Source by the American Institute of Nutrition Vitamins. In addition, the Food and Drug Administration (FDA) Trusted Source does not recognize it as safe. Some people may take laetrile in the treatment cancer. However, many experts consider the compound controversial, as no research supports it as an effective treatment and instead links it to potentially severe side effects. Vitamin B17 may cause the body to produce cyanide, a poisonous and dangerous chemical. Vitamin B17 is also called as laetrile, amygdalin, or the scientific name D-mandelonitrile-b-D-glucosido-6-b-D-glucoside**.**

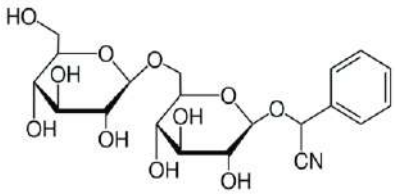

Fig 01: Chemical structure of amygdalin

A person can take amygdalin orally or as an injection intravenously or intramuscularly. Although many refer to this compound as vit- B17, it is not actually a vitamin. Most of the research on vitamin B17 focuses on its union with cancer.

It may lower blood pressure: In 2011 there are studies on people between 40 to 65 years age group found that apricot kernels which having amygdalin helped lower systolic blood pressure by 28.5% and diastolic blood pressure by 25%. However, this was a low quality study that did not use a control group, so more research is necessary.

It may provide pain relief: Older research on rats indicates that amygdalin may help reduce the pain. However, there is a deficiency of human-based

Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

evidence to suggest the effectiveness of amygdalin as a pain reliever.

Vitamin B17 tablets are sold as an alternative cancer therapy medication. Its use however is not benign, given that it is metabolized in to hydrogen cyanide. Basic anticancer molecular mechanisms of amygdalin have mainly been cell cycle inhibition, apoptosis induction, cytotoxic effect stimulation, and immune function regulation in the human body. Amygdalin has been examined to induce apoptosis by increasing the activity of caspase-3 in HeLa cells and downregulating Bcl-2. In parallel, Bax has appeared to be augmentation in HeLa cells treated with amygdalin, suggesting that an endogenous pathway may be involved in apoptosis. Many human cell lines, including those from cancer cells of the lung, breast, colon, testes, prostate, rectum, and bladder, have shown that amygdalin can cause apoptosis and cell cycle arrest. More to the point, the main molecular mechanism of apoptosis is the initiation of the caspase-3 protease, which is initiated by cellular replication of the Bax protein of cytochrome C.

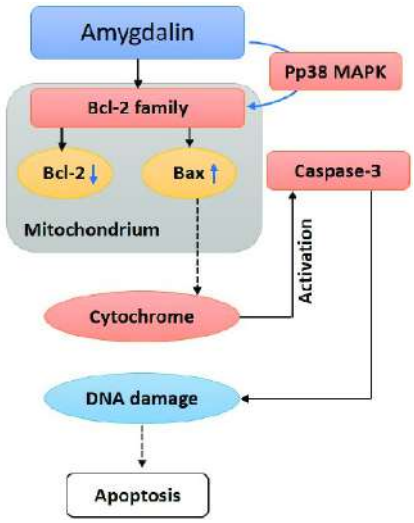

Fig 02: A schematic depicting how amygdalin induces apoptosis

DISCUSSION

Amygdalin could be useful as a co-therapeutic agent in lung tumors. This compound significantly influences the apoptosis of A549 and PC9 lung cancer cells in a dose-dependent manner via the mitochondrion-mediated and caspase-dependent apoptotic pathway. In vitro inhibition of proliferation of lung cancer cell lines H1299/M and PA/M needed a high concentration of amygdalin. However, at a low concentration of amygdalin, it was observed that the invasion and migration abilities of H1299/M PA/M cancer cells were significantly hesitant. Thus, it was recommended that amygdalin is likely to have antimetastatic activity, inducing apoptosis and inhibiting the accumulating of lung cancer cells. Amygdalin has been shown to urge apoptosis and inhibit the adhesion of breast cancer cells by increasing the level of pro-apoptotic Bax proteins and caspase-3 activity and decreasing the level of the anti-apoptotic Bcl-2 protein. Amygdalin was also found to decrease the moving of MDA-MB-231 cells more than MCF-7 cells. Furthermore, the urge of proteolytic enzymes was suggested to promote the activation of apoptotic events in MCF-7 breast cancer cells.

Amygdalin dose-dependently inhibited tumor growth and decreased tumor clones in prostate cancer cell lines by inhibiting the G0/G1 phase. Moreover, reserve of prostate cancer cell growth and tumor growth by amygdalin were evident, tell a function of the metabolic enzymes betaglucosidase (β-glucosidase) and rhodanese in regulating the anticancer activity of amygdalin in vivo. The activation of amygdalin by β-glucosidase could be considered an enzyme therapy strategy that may be a promising new path for the targeted treatment of prostate cancer. In alternative and traditional medicine, amygdalin is often used for the prevention and treatment of colorectal tumor malignancies. The anticancer effect of amygdalin on colorectal cancer cells, for example in human SNU-C4 colorectal cancer cells, has been seen to be promoted by reducing the expression of cell-cycle-related genes. Colon cancer cells were reported to be more sensitive to the result of amygdalin compared to normal cells due to their higher concentration of β-glucosidase and lower levels of the liver enzyme rhodanese, which can convert cyanide to the based on harmless compound thiocyanate. Amygdalin has been documented to crucially inhibit the proliferative activity of HeLa cervical cancer cells. The anti-apoptotic protein Bcl-2 was downregulated and the pro-apoptotic Bax was upregulated in HeLa cells manage with amygdalin. Moreover, the Bax-to-Bcl-2 ratio and caspase-3 activity were increased by vitamin B 17 treatment in HeLa cells, reinforcing the apoptotic result of amygdalin on cervical cancer cells. Amygdalin has been demonstrated to restoring the apoptotic process by upregulating caspase-3 expression and downregulating Bcl-2 expression, as well as urging

HepG2 and EAC hepatocellular cancer cell proliferation and upregulating Beclin-1 expression. It is noteworthy that the union of amygdalin with metformin exerted a promising effect when compared to amygdalin alone; their union was more cytotoxic, showing a greater ability to induce apoptosis and detain the cell cycle in hepatocellular cancer cells.

Toxicity of Amygdalin

More consumption of amygdalin can lead to poisonous effects. Amygdalin is converted into glucose, benzaldehyde, and hydrogen cyanide by an endogenous enzyme when fruit pits are crushed. More analytically, when HCN is set free, cytochrome oxidase C can react with the iron ion. This can induce the formation of metal-ion fusion which lyse cells and inhibit ATP synthesis. Amygdalin has been reported to employ toxic effects when ingested with supplements. Oral intake of 500 mg amygdalin might release 30 mg of poison. Cyanide toxicity can be life-threatening due to the decrease of mitochondrial oxygen usage, leading to cell death. Cancer cells are having lack rodhanase, an enzyme which acts as a cleansing agent by binding iron sulfur centers on cell membranes and converts HCN into a less toxic metabolite, thiocyanate. However, following parenteral administration of amygdalin/laetrile by parenteral route, more than 80% of thiocyanate was detected in rats' and rabbits' urine. The adverse effects of cyanide toxicity include tachycardia, confusion, nausea, headache, and more severely, neuromyopathy, cyanosis, coma, convulsions, and death. Over modern decennium, several in vitro and in vivo studies have been performed, single or multiple doses and different forms of amygdalin administration (intravenous and intramuscular), that showed no HCN formation, highlighting the essential role of the gut in human body physiology after substance consumption. The anaerobic bacterial phyla existence in the gut presents a high β-glucosidase activity, which requires for amygdalin to hydrolyze HCN. Besides HCN toxicity has been found to exist under certain circumstances. In some cases, toxicity derived from the ingestion of several doses of amygdalin and there were no HCN side effects associated with high doses. Variable factors, including healthy bacteria consumption, diet, and age, may alter the gut organization, which is responsible for the conditions under which toxicity occurs. Notably, serious reactions were not reported for a dose of 3 g orally administrated amygdalin in patients with cancer who were look for alternative therapies. The minimum harmful dose of vitamin B17 for an adult is 50 mg or 0.5–3.5 mg/kg of body mass. However, the interaction with likewise consumption of vitamin C seems to activate its side effects, while vitamin B12 and sodium disulfate solution have been used as antidotes without adverse effects. Several studies have documentation against anticancer activity of amygdalin and its therapeutic use for cancer treatment and pain relief.

CONCLUSION

The present study recognize that a significant burden of concern is generated from the misuse of cyanogenic glycoside products for cancer prevention and treatment. Additionally, significant toxicity can happen unintentionally requiring hospital admission. There is evidence of ongoing supply, use and harm from illicit amygdalin/B17 products which carry risk of severe toxicity and increased health expenditure. Poisons center data can according towards ongoing surveillance and control of this public health threat.

ACKNOWLEDGEMENT

The authors express their sincere thanks to the management, Mother Teresa Pharmacy College, Sathupally, Telangana for providing the necessary facilities to carry out the review article.

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HOW TO CITE: Praveen Kumar Dasari*, J. Kumar Raja, P. Prem Kumar, G. Durga, Y. Shiva Bhavani, D. Kyathi Lekha, A Review on Vitamin B 17 (Amygdalin), Int. J. Sci. R. Tech., 2024, 1 (3), 50-53. https://doi.org/10.5281/zenodo.13893072