MEDWIN PUBLISHERS
Committed to create value for Researchers

Bioequivalence & Bioavailability International Journal
ISSN: 2578-4803

Bioavailability of Natural Products

Eldahshan OA[1,2] and Singab ANB[1,2]*

[1]Department of Pharmacognosy, Faculty of Pharmacy, Ain-Shams University, Egypt

[2]Center for Drug Discovery Research and Development, Ain Shams University, Egypt

Editorial

Volume 3 Issue 1

Received Date: September 10, 2019

Published Date: September 19, 2019

DOI: 10.23880/beba-16000137

***Corresponding author:** Abdel Nasser B. Singab, Department of Pharmacognosy, Faculty of Pharmacy, Ain-Shams University, 11566, Cairo, Egypt. Phone: 002-010-05036231, Fax: +20 2 24051107; Email: dean@pharma.asu.edu.eg

Editorial

Bioavailability is the quantity of a substance that is utilized after its assimilation in circulation [1]. The bioavailability of a drug can be assessed using *in vivo* tests on either animals or humans which includes digestion, metabolism, and circulation either itself or its metabolites to the tissues and then excretion [2].

Establishing the pharmacological basis for efficacy of herbal products is a constant challenge due to their complex composition and the ever-increasing list of their putatively active constituents.

An important question concerning the bioavailability is what degree and how fast compounds are absorbed after administration of herbal medicinal products [3].

Its complexity lies in the differtent and lots of component in the extract and the lack of knowledge of all active constituents. With increasing knowledge of active constituents and availability of highly selective and sensitive analytical methods for certain natural medicinal products data on, bioavailability became more available in the last decade [3].

Concerning pure natural compounds, it is easier to study its bioavailability in human. For example, triterpenic acids as oleanonic, mastihadienonic, isomastihadienonic, and moronic acid are bioavailable and may exhibit antioxidant effects on humans after oral administration of a natural terpene-rich product (as Mastiha product) [4].

Gallic acid is a phenolic acid is a phenolic acid and is a very well absorbed acid in stomach, small intestine or both. After ingestion, gallic acid is transformed and can be found in plasma and urine, mainly as 4-*O*-methylated form and *O*-glucuronidated forms [5].

Other phenolic acids as caffeic acid, sinapic acid and ferulic acid are considered as hydroxycinnamic acids. The free form of hydroxycinnamic acids is quickly absorbed from the stomach and small intestine. Then, hydroxycinnamates are conjugated by intestinal and hepatic detoxification enzymes [6]. The esterified forms, with quinic acid, tartaric acid or carbohydrate derivatives are digested in the colon [5].

In contrary, an example of the difficulty of bringing polyphenols to clinical successes is resveratrol (in grapes, berries, peanuts) [6]. Myriad of publication demonstrated the ability of resveratrol to combat and prevent several human cancers in tissue culture and in mice (breast, prostate, colon, bladder, endometrial, and skin) [7,8]. But, its use in humans as a chemopreventative agent looks to be very limited due to its poor bioavailability [8,9]. It is well tolerated in humans but is easily and rapidly metabolized, leading to a short half-life which hinders its effectiveness [10,11].

It was reported that the low bioavailability of taxol after oral administration would result from metabolism by the enzymes or counter-transport processes due to P-glycoprotein in the intestinal wall [13]. Another example of pure compound of poor bioavailability is curcumin where its pharmacokinetics have revealed poor absorption and rapid metabolism which severely curtails its bioavailability. When it is orally ingested, the major portion is excreted through the feces and only small portion is absorbed within the intestine. The absorbed

curcumin suffered a rapid metabolism in the livers and plasma. It is extensively converted to its water-soluble metabolites (glucuronides and sulfates) and excreted through urine.

So, although of isolation of many pure natural compounds has been achieved over the past decades, a challenge still exist which is their poor bioavailability.

Conclusion

Herbal mixture is so difficult to ascertain its bioavailability in human as they are multi-components of known and unknown structures. The position is inverted in pure compounds as their bioavailability could be determined both *in vivo* and in human. Their bioavailability *in vivo* could be ascertained in human either by confirmation or denial. The poor bioavailability of some of them must be seriously taken into account to select the route of administration as well as the formulation.

References

1. Richard W (2005) Bioavailability: Definition, general aspects and fortificants. In: Caballero B, et al. (Eds.), Encyclopedia of Human Nutrition, 2nd (Edn.), Oxford Elsevier Ltd.: Oxford, UK.

2. Carbonell-Capella JM, Buniowska M, Barba FJ, Esteve MJ, Frígola A (2014) Analytical methods for determining bioavailability and bioaccessibility of bioactive compounds from fruits and vegetables: A review. Compr. Rev. Food Sci. Food Saf 13(2): 155-171.

3. Bhattaram VA, Graefe U, Kohlert C, Veit M, Derendorf H (2002) Pharmacokinetics and bioavailability of herbal medicinal products. Phytomedicine 9(S3): 1-33.

4. Papada E, Gioxari A, Brieudes V, Amerikanou C, Halabalaki M, et al. (2008) Bioavailability of Terpenes and Postprandial Effect on Human Antioxidant Potential. An Open-Label Study in Healthy Subjects. Mol Nutr Food Res 62(3).

5. Olthof MR, Hollman PC, Zock PL, Katan MB (2001) Consumption of high doses of chlorogenic acid, present in coffee, or of black tea increases plasma total homocysteine concentrations in humans. Am. J. Clin. Nutr 73(3): 532-538.

6. Lafay S, Gil-Izquierdo A (2008) Bioavailability of phenolic acids. Phytochem. Rev 7(2): 301-311.

7. Yu W, Fu YC, Wang W (2012) Cellular and Molecular Effects of Resveratrol in Health and Disease. J Cell Biochem 113(3): 752-759.

8. Ndiaye M, Philippe C, Mukhtar H, Ahmad N (2011) The Grape Antioxidant Resveratrol for Skin Disorders: Promise, Prospects, and Challenges. Arch Biochem Biophys 508(2): 164-170.

9. Roupe KA, Remsberg CM, Yáñez JA, Davies NM (2006) Pharmacometrics of Stilbenes: Seguing towards the Clinic. Curr Clin Pharmacol 1(1): 81-101.

10. Asensi M, Medina I, Ortega A, Carretero J, Baño MC, et al. (2002) Inhibition of cancer growth by Resveratrol Is related to its low bioavailability. Free Radical Biol Med 33(3): 387-398.

11. Cottart CH, Nivet-Antoine V, Laguillier-Morizot C, Beaudeux JL (2010) Resveratrol Bioavailability and Toxicity in Humans. Mol Nutr Food Res 54(1): 7-16.

12. Torne SJ, Ansari KA, Vavia PR, Trotta F, Cavalli R (2010) Enhanced oral paclitaxel bioavailability after administration of paclitaxel-loaded nanosponges. Drug Deliv 17(6): 419-425.

13. Liu W, Zhai Y, Heng X, Che FY, Chen W, et al. (2016) Oral bioavailability of curcumin: problems and advancements. J Drug Target 24(8): 694-702.