

*BCM-95™*

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## BIOAVAILABILITY OF BIOCURCUMAX™ (BCM - 095™)

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### Abstract

Curcuminoids are the yellow colouring matter, the most active molecules of turmeric (*Curcuma longa*) one of the familiar spice possessing numerous bioactive components. But it is suggested and proved that the total curcuminoids absorb by animal system limit to 50 - 60 per cent. Biocurcumax™ (BCM-095™) is a unique blend which enhances the bioavailability of curcumin. The study described here reveals the bioavailability of Biocurcumax™ (BCM-095™) in human volunteers.

### Introduction

Turmeric (*Curcuma longa*) is a bright yellow ancient spice native to Asian countries. It has been used as a traditional remedy dating back to 600 BC. Turmeric is well known for its applications as a cosmetic, condiment and flavouring agent<sup>1</sup>. It has been used in the Indian ayurvedic system of medicines, unani medicines as well as in Chinese medicines. Turmeric is the main spice which has been used by different communities of people for their religious purposes<sup>2</sup>. Turmeric has been used

internally as a tonic for the stomach, blood purifier and externally for the treatment of skin diseases, and wound healing<sup>3,4</sup>.

The active components of turmeric are identified as curcumin [1,7 bis (4 hydroxy - 3 - methoxy phenyl) 1,6 - heptadiene - 3,5 - dione] and volatile oil. Curcumin, which gives yellow colour to turmeric and essential oil which gives the aroma are responsible for the biological activities<sup>5,6</sup>. In addition to curcumin, two other curcuminoids are also identified in turmeric - mono

Key words: *Curcuma longa*, Biocurcumax, curcumin, bioavailability



demethoxy curcumin and bis demethoxy curcumin<sup>7</sup>.

The anti-inflammatory, anti-arthritis, anti-allergic, anti-bacterial and anti-tumor activities of curcuminoids are scientifically known<sup>8,9</sup>. As a polyphenol, curcumin is an anti-oxidant, preventing cell and tissue destruction due to free radical activity. It acts as a scavenger of oxygen radical, hydroxyl radical, nitric oxide radical etc. Hence it helps to prevent / retard various cardiovascular, viral and other chronic diseases like arthritis, cancer and AIDS by neutralizing existing free radicals<sup>10</sup>. Curcumin protects the brain from lipid peroxidation without affecting the central nervous system. Further it is proved that

essential oil of turmeric has a remarkable synergistic effect for the activities of naturally occurring anti-tumor components<sup>18,19</sup>. Immunological studies demonstrated that essential oil of turmeric inhibited the proliferation and the natural killer activity of human lymphocytes<sup>19</sup>. Moreover the essential oil of turmeric induces internucleosomal DNA fragmentation in association with programmed cell death in human myeloid leukemia HL-60 cells<sup>17</sup>.

Toxicity has not been reported at standard dosage levels for curcumin. Externally high doses of turmeric, its alcoholic extract and pure curcumin do not produce toxic effects in any animal studied<sup>11</sup>.

Even though curcumin possesses many biological activities, its absorption in the animal system is very little. Pharmacokinetics studies in rats indicate that the absorption of pure curcumin from the gastrointestinal tract is about 60 – 65 per cent after administration of a single oral dose of 400 mg/kg<sup>12</sup>. The very poor absorption of curcumin from the gastrointestinal tract has been confirmed by Guido Shoba et al<sup>13</sup>. They have studied the effect of piperine on the absorption of curcumin on human volunteers. On a dosage of 400 mg of curcumin, 20 mg of piperine has been reported to increase absorption considerably<sup>13</sup>. Curcumin is often formulated with bromelain to enhance absorption<sup>14</sup>. Piperine and

Table 1: Experimental design

Group	No. of volunteers	Age	Diet	Dosage
I Curcumin	8	25-45 years	Avoided turmeric containing foods 24 hours before and after taking curcumin / Biocurcumax capsules	500 mg capsules containing 450 mg total curcuminoids, 8 capsules as a single dose
II Biocurcumax <sup>TM</sup> (BGM - 095 <sup>TM</sup> )	7			500 mg capsules containing 450 mg Biocurcumax 8 capsules as a single dose



Bromelain are extracted from other products like black pepper and pineapple.

Value added spice and herbal extracts can be formulated into nutraceuticals and related products. Biocurcumax™ is a unique blend (Patent No. 200430), formulated by the R&D Laboratory of Arjuna Natural Extracts for enhancing the absorption of Curcuminoids<sup>15</sup>. It is a reconstituted turmeric extract standardised with curcuminoids<sup>16</sup>. Studies conducted on Albino rats show that the dietary absorption of pure curcumin was only 50-60 percent whereas the absorption of curcumin was increased to about 96-97 per cent in the Biocurcumax blend<sup>16</sup>.

The present study reveals the bioavailability of total curcuminoids in human volunteers using the Biocurcumax™ (BCM-095™). This study was carried out during 2003 at R&D Laboratory of Arjuna Natural Extracts, Binanipuram.

#### Experimental design

Fifteen healthy human volunteers of either sex, under the age group of 25-45 were identified and they were divided into two groups of eight

and seven each. The experimental design is shown in Table 1.

All the chemicals used were of analytical grade. Pure curcumin was purchased from Sigma Chemical company, St. Louis USA. Dried rhizomes of raw turmeric was purchased from the local market at Aluva and identified as per specimen ID-AE-HBRS-030. Curcuminoids were extracted as per the production flowchart of Arjuna QCFL-04. The final product obtained CPE-014 was analysed based on the quality control standards QCD-05. Biocurcumax™ was also analysed as per the standard protocol.

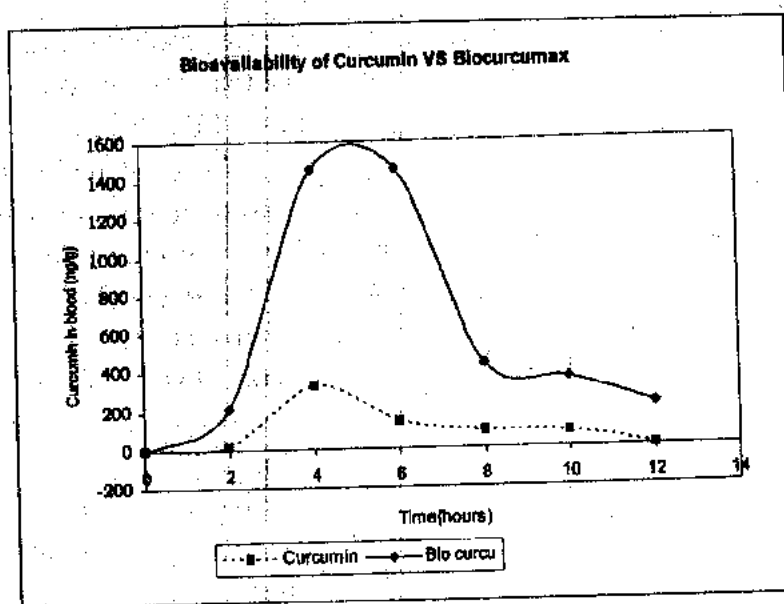
#### Human volunteers

Human volunteers were

arranged from the local places around Aluva and they were advised to report at the R&D Laboratory of Arjuna Natural Extracts at Binanipuram. They were under the age group of 25 - 45 and belong to both male and female. They were advised to follow normal diet prior to the experiment and instructed to avoid food items containing turmeric especially on the previous day to the test and on the test day.

#### Experimental method

The purity of curcumin of both curcumin capsules and Biocurcumax capsules were estimated spectrophotometrically by FCC method. Regarding the experimental protocol, the group volunteers were considered as the





curcumin group and group II volunteers as the Biocurcumax group. Blood samples (5 ml each) of these volunteers were collected at 7 am before taking the capsules (0 hour). They were given the curcumin / biocurcumax capsules (8 nos.) as a single dose along with a glass of water. Blood samples (5 ml) were taken one hour, two hours, three hours, four hours, six hours, eight hours, 10 hours and 12 hours after taking the capsules. Blood samples were collected in anticoagulant (Heparin) treated weighed tubes. Weight of the blood obtained was noted and extracted with Ethyl acetate. The ethyl acetate portions were pooled filtered and concentrated. This was weighed and made upto a known volume by HPLC grade methanol. This was then filtered using 0.2 micron membrane filter. Twenty microliter of this solution was injected into the HPLC column.

#### HPLC conditions

Apparatus : Shimadzu HPLC with UV detector

Column : CLS-ODS,  
C<sub>18</sub>, 250 x 4.6

Injection volume : 20 ml

Mobile phase : Methanol  
(HPLC grade)  
: Isocratic flow

Flow rate : 1 ml/ min.

Run time : 30 minutes

Detection wave  
length : 420 nm

#### Results and Discussion

Biocurcumax™ (BCM-095™) is a reconstituted purified and standardized turmeric extract which enhances the bioavailability of curcumin in blood.

Study reported here reveals the absorption of curcuminoids in normal curcumin powder and biocurcumax blend (BCM-095™) on human volunteers. The results are shown in Fig. 1.

This study indicates that the bioavailability of biocurcumax is five-seven fold higher than curcumin. Moreover the results shows that curcumin is retained in the blood for only four-five hours whereas that for biocurcumax is more than 8 hours with higher level of curcumin in the blood. The availability of a pharmacologically active product in the blood is very important for the biochemical function. Based

on this when specific need arises, Biocurcumax can be given to maintain the continuous availability of curcumin in the blood.

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