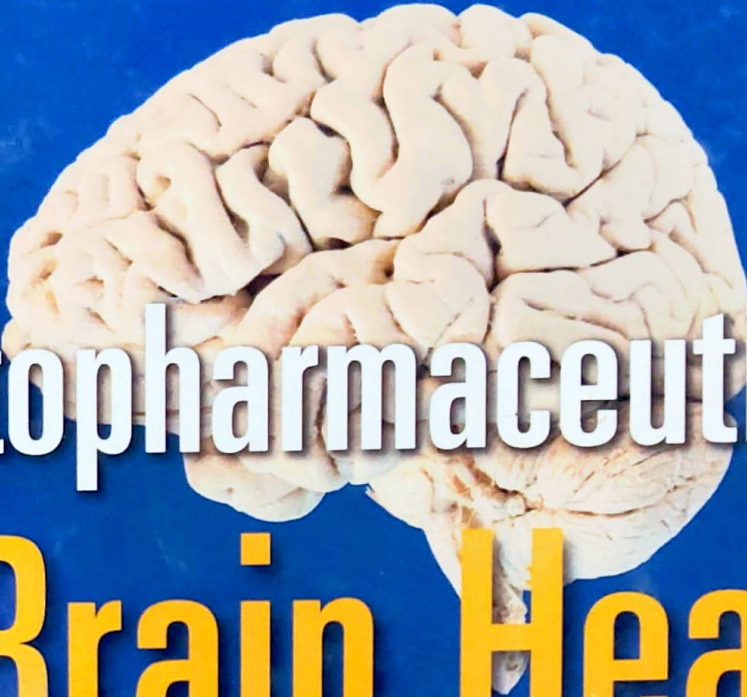




Phytopharmaceuticals for **Brain Health**



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**Shahnaz Subhan
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3 Environmental Pollution and Climate Change Impacts on Human Health with Particular Reference to Brain *A Review*

*Monowar Alam Khalid and
Syed Monowar Alam Shahid*

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3.1 INTRODUCTION

The environment has a profound impact on all living beings, be it plants, animals, or humans. The physical and social environment is an important factor to shaping our lives and determining health, along with our genetic makeup and personal characteristics. A healthy environment instills confidence, safety, good health, and peace of mind, leading to a healthy growth and better contributions as individuals toward society, communities, and their ecosystems. The environment starts impacting our brain right from the beginning of the human existence, i.e., through adequate nutrition to the fetus in the womb during pregnancy, which ensures brain stimulation.

In the history of human evolution, brain enlargement was very slow during the first four million years but developed faster for the past 800,000 years (Potts, 2010), which interestingly coincided with the period of strong climate fluctuations in the world. The larger brain size enabled hominins to process and store information and plan in advance to solve abstract problems. The human brain helped hominins find new ways to cope with their surrounding environment, as evident around 280,000 years ago, which was in fact the beginning of the technological thinking of the human brain, when they made tools and spears to help in cutting and hunting, and there are evidences that prove that even grindstones were used to process plant foods (Potts, 2010). Various studies suggest that human adaptations evolved as a response to environmental changes (Potts, 2010; Potts and Sloan, 2010).

Evidences suggest that the hominid evolution occurred in East Africa, which underwent dramatic changes in its landscape during the last 10 million years from a flat homogeneous region with mountains and vegetation to numerous lake basins due to changes in local precipitation and evaporation regime. This unusual geology and climate of East Africa created periods of highly variable local climate, which could have driven hominin evolution, encephalization, and dispersal, as evident from a significant hominin speciation and brain expansion event coinciding with the occurrence of highly variable, extensive, deep water lakes (Maslin et al., 2014). Studies of Professor Mark Maslin of the University College London show that “modern humans were born out of climate change, as they had to deal with rapid switching from famine to feast, and back again, which drove the appearance of new species with bigger brains,” which forced humans to disperse out of East Africa (Shultz and Maslin, 2013). Various objects found in Africa that gave a clue about the origin of human brain size and the respective tools used by humans during that period are shown in Figure 3.1.

The human brain is just about 2% of the whole body weight, but it uses 20% of the oxygen (Raichle and Gusnard, 2002). The brain is nearly 73% water and a dehydration of 2% can affect your memory and other cognitive skills (Mitchell et al., 1945; Adan, 2012). Interestingly, the brain, which weighs about three pounds, has 60% fat, making it the fattiest organ of the body, having nearly 25% of the body's cholesterol stored in it, since cholesterol is an integral part of every brain cell, without which brain cells will die (Björkhem and Meaney, 2004). The brain is the most vital organ of our body (Figure 3.2), which is the seat for consciousness, learning, memory, emotions, and detection of any changes happening around us