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Indian roots of malaria parasite

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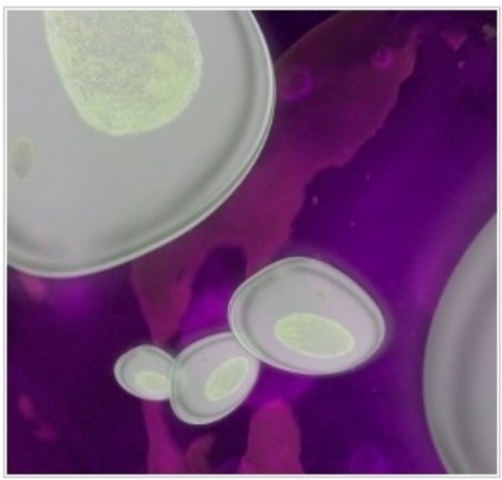
Plasmodium falciparum, the parasite that causes malaria, has long been thought to have originated in Africa. As humans started farming and living in settlements around crop fields, easily transferrable diseases such as malaria got a foothold. A recent study suggests that *P. falciparum* was probably also present in ancient India at around the same time[1].

Mosquito-borne disease malaria, caused by different species of the parasite Plasmodium, is very common in the tropical and subtropical regions of Africa, Asia, and South and Central America. The parasite has been steadily evolving resistance to commonly used anti-malarials. Moreover, widespread human travelling spreads the parasites to new, previously malaria-free areas, with the possibility of more virulent strains emerging.



An illustration of the malaria parasite Plasmodium.
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Analyses of DNA from the mitochondria of *P. falciparum* have not included Indian samples till now, says Aparup Das from the National Institute of Malaria Research at New Delhi. Das and his team have now included 44 *P. falciparum* samples from Odisha, Assam, Gujarat and Jharkhand to the existing database. The mitochondrial DNA of *P. falciparum* provides a window into its evolutionary history. Comparing the Indian samples to the global database gave the researchers insights into how *P. falciparum* malaria spread historically.

Genetic diversity, the total number of genetic characteristics in a species, is usually highest in areas where the species first evolved. In the case of *P. falciparum*, African species have shown the highest diversity in all analyses till now. The Indian data now shows that genetic diversity of Indian *P. falciparum* is higher than samples from other areas and equivalent to the diversity in Africa. Indian *P. falciparum* was found to be older than *P. falciparum* from Southeast Asia, Africa and South America. "This implies the Indian *P. falciparum* has an ancient evolutionary history," Das told *Nature India*.

Using the sequences, the authors could also calculate the historic population trends of *P. falciparum* in India. The *P. falciparum* population seems to have expanded 6000-12000 years before present. "Similar to African *P. falciparum*, the population of Indian *P. falciparum* also coincided with the date of initiation of agriculture practice", says Aditya Prasad Dash, a former director of the National Institute of Malaria Research and advisor to WHO. "Interestingly, nothing of this sort has ever been reported from Africa, although lots of mitochondrial genomes have been sequenced in African *P. falciparum*. Therefore, the results are very important as well as interesting", he says.

Studies have shown that Plasmodium parasites infecting humans today were originally parasites of non-human primates like gorillas and macaques. This study compared Indian *P. falciparum* with Plasmodium lineages affecting non-human animals. The analysis showed Indian *P. falciparum* were "probably missing links in the process of host switching from non-human primates to humans", Das says.

References

1. Tyagi, S. *et al*. New insights into the evolutionary history of *Plasmodium falciparum* from mitochondrial genome sequence analyses of Indian isolates. Mol. Ecol. (2014) doi: 10.1111/mec.12800