CSIR-CCMB

Blood parameters alter when people change their altitude: Evidence from the study on Tibetans

Hyderabad, 20th May, 2021: Tibetans are one of the oldest high-altitude inhabitants in the world. There are known genetic and physiological factors that help them endure low-oxygen conditions. However, their population have now moved to low-altitude regions such as in the state of Karnataka. Dr Thangaraj and his team at the CSIR-Centre for Cellular and Molecular Biology (CCMB), Hyderabad have studied changes in physiological factors of Tibetans who now inhabit the low-altitude regions.

In this study, physiological factors of the people of the Tibetan ethnicity from various regions of the high altitudes of Ladakh at 4500-4900 meters, India are compared with those inhabiting in the Tibetan settlements in Bylakuppe, Karnataka at an altitude of around 850 meters. The population in Karnataka had migrated from Tibet following the atrocities by the People's Liberation Army of China during or after Tibetan uprising in 1959. They have been in Karnataka for the last 50 years. The researchers find that the blood parameters in Tibetans in Karnataka, are significantly different compared to their high-altitude counterparts. The study has been recently published in the *Journal of Blood Medicine*.

Tibetans inhabiting high-altitude areas (in left) and low-altitude areas (in right)

"We found that the red blood cells, hemoglobin concentration and hematocrit are significantly lower in the low-altitude Tibetans. Their hemoglobin levels are much closer to those living on the plains than the other Tibetans who live beyond 4500 meters", said Nipa Basak, the first author of the study.

“Our study suggests that, when Tibetan people reside in non-native, low-altitude, area for long time, their body undergoes various adaptations to cope with the relatively hyperoxic environment in low-altitude areas”, said Dr. K Thangaraj, the lead investigator of this study, and presently Director of the DBT-Centre for DNA Fingerprinting and Diagnostics (CDFD), Hyderabad.

Earlier studies had shown that among Tibetan population, those with lower hemoglobin concentration have better reproductive fitness in women and exercise capacity among men. “It would be interesting to explore exercise capacity and reproductive fitness in the low-lander Tibetans. It will also be worthwhile noting how long these changes persist, if the Tibetan inhabited in Karnataka migrates back to high-altitude”, added Dr. Thangaraj.

“Such population-based studies conducted by CCMB help us in understanding adaptation in people who migrate to different environments from a molecular point of view”, said Dr. VM Tiwari, Director in-charge, CCMB.

This work was done in collaboration with researchers from Ladakh and Karnataka. This includes Dr Tsering Norboo, from Ladakh Institute of Prevention, Ladakh, and Dr. MS Mustak from Mangalore University, Karnataka.

Contacts: Dr. K. Thangaraj, Ph no. 9908213822