Title:

Pre-Induction Medical Screening for Sickle Cell Trait Among Troops Deployed to High-Altitude Areas: A Cross-Sectional Study in Shahjahanpur and Bhatinda Army Units

Objective:

This study was undertaken with the following aims:

- To identify previously undiagnosed cases of sickle cell trait (SCT) among army personnel from regiments recruited predominantly from sickle cell belt regions of India.
- 2. To mitigate the risk of SCT-related complications during high-altitude deployment through early detection.
- 3. To provide genetic and social counselling to individuals and their families in the event of positive findings.
- 4. To advocate for the inclusion of mandatory pre-induction screening for haemoglobinopathies prior to high-altitude postings.

Methodology:

- Study Design: A cross-sectional, pre-induction medical screening.
- Study Population:
 - 5 Mahar Regiment (Shahjahanpur, Uttar Pradesh): 349 army personnel
 - 5 Bihar Regiment (Bhatinda, Punjab): 288 army personnel
 Participants were scheduled for deployment to high-altitude regions and were primarily recruited from high-prevalence sickle cell belt areas.

• Inclusion Criteria:

Personnel with no known prior diagnosis of sickle cell trait or related haemoglobinopathies.

• Exclusion Criteria:

Individuals with a previously known diagnosis of sickle cell anaemia, sickle cell trait, or those who did not provide informed consent.

- Study Duration:
 - Shahjahanpur screening: 9th 11th May 2023
 - Bhatinda screening: 30th June 1st July 2023

• Data Collection Process:

Each participant completed a structured proforma, capturing demographic details, ethnicity, family history (including a pedigree chart), history of high-altitude exposure, and relevant clinical symptoms. This was followed by a comprehensive

physical and clinical examination.

Blood samples were collected for confirmatory testing via High Performance Liquid Chromatography (HPLC) to identify haemoglobin variants.

The screening was conducted under the guidance of a medical mentor, with trained personnel administering interviews, clinical evaluations, and phlebotomy.

Conclusion:

This study underscores the importance of pre-induction screening for sickle cell trait among troops being deployed to high-altitude regions, especially those originating from regions with a high prevalence of haemoglobinopathies. Early identification of SCT enables timely intervention, risk mitigation, and appropriate counselling—thus safeguarding both the health of the soldiers and the operational efficacy of the units. The findings advocate for the implementation of standardized SCT screening protocols across all high-risk deployments, and raise broader public health awareness regarding the need for genetic screening and education in vulnerable populations.