Introduction

Hypoxia is the main factor at high altitude causing various physiological effects including anorexia.

Anorexia is one of the major causes for weight loss at high altitude.

Appetite is regulated by the integration of hormones from gastrointestinal tract, pancreas and adipose in the hypothalamus.

Appetite regulatory hormones are either orexigenic (feeding inducers) or anorectic (feeding inhibitors).

ER stress mediated transcriptional and translational alterations caused by hypoxia may alter the synthesis and secretion of hormones that are important in the regulation of feeding behavior during hypoxic exposure.

Materials and Methods

Objectives

1. Screening of appetite regulatory proteins of peripheral origin in rat model of hypobaric hypoxia induced anorexia
2. To find out how cellular expression of appetite regulatory proteins are modulated in adipose tissue
3. To find out appetite related molecular changes in stomach and liver

Stomach tissue

- Ghrelin expression increased in stomach.
- Ghrelin receptor levels also increased on exposure and reverted to normal on 7th day
- Adiponectin which is an adipocyte secretory protein was detected in stomach tissue and found to increase during hypoxia.
- Cholecystokinin receptor level also decreased on hypoxic exposure.
- PPARα and PPARγ were also found to decrease during hypoxia.
- Endoplasmic stress marker GRP78 did not show any change indicating that there is no ER stress in stomach during hypoxia

Liver

- Cholecystokinin receptor levels decreased during hypoxia and returns to be normal from 7th day onwards.
- PPARα and PPARγ levels increased in liver tissue during hypoxia as compared to control.
- GRP78 protein and mRNA was observed to increase during hypoxia showing presence of ER stress. Caspase 12 level reduced showing no ER stress mediated apoptosis.

Conclusion

- In conclusion, expression pattern of appetite regulatory hormones were changed during hypoxia. Reduction in adipocyte size was observed which may explain the weight loss. Ghrelin and Cholecystokinin receptors were also modulated in liver which may lead to impairment in glucose metabolism. PPAR isoforms were identified as promising targets in the tissues for alleviating the changes during hypoxia induced anorexia.
- ER stress occurs in adipose and liver but not in stomach tissue indicating a possible tissue specific role of ER stress pathway in response to hypoxia
- Thus improving food intake and preventing the weight loss by rectifying the changes observed in appetite regulatory hormones and the molecular targets might provide better acclimatization and to cope up with high altitude environment.

Acknowledgment:

Authors are thankful to DRDO for funding the project. Arul Joseph Duraisamy and Susovon Bayen are thankful to DRDO for senior research fellowship. Supriya Saini is thankful to UGC for junior research fellowship.