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LETTER TO THE EDITOR

Insulin storage in the Upper Himalayas

JK Mokta[1], S Kalra[2]

[1]*Department of Medicine, IGMC, Simla, India*

[2]*Department of Endocrinology, Bharti Hospital, Karnal, India*

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Mokta JK, Kalra S

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Dear Editor

Insulin storage is a challenge in many resource-challenged settings, where adequate refrigeration may not always be available. Various research and reviews are available which discuss innovation and improvisation in insulin storage in rural areas[1,2]. All these articles, however, focus on hot climates, where it is difficult to keep insulin cool enough.

There are, however, resource-poor environments where keeping insulin warm enough is an issue. These include mountainous areas such as the Himalayas and the Andes, located in relatively less affluent countries. One such 'cold desert', located in the Himalayan state of Himachal Pradesh, in India, is Spiti. Located at an altitude of approximately 3000–4500 m above sea level, Spiti remains snowbound for up to 6 months in a year[3]. Temperature extremes range from 30°C in summer to –20°C in winter. Persons living with diabetes in Spiti source their insulin and ancillary supplies from the state capital Simla, in bulk. Facilities for monitoring of glucose and for medical check-ups are limited, especially during the winter season. Insulin storage and disposal also pose significant challenges, and these are cited by patients as excuses to avoid insulin when it is suggested to them.

During winter, members of the family stay together in a single room named the 'living room'. The centre of the living room has a smokeless iron-framed oven, called a *bukhari*, in which firewood is used to cook food and, at the same time, warm the room. Indoor temperature may vary between 30°C and 40°C in the daytime, and 10–20°C at night, while the outdoor winter temperature remains between –10°C and –20°C.

Persons living with diabetes on insulin therapy report insulin storage to be a major challenge during winter. They are unable to store their insulin vial and pens in living rooms, because of extreme heat, and cannot use adjoining rooms, as night-time temperatures routinely fall below freezing point. Hence, they are advised by health workers to store insulin vials and pens by wrapping them in two to three layers of warm woollen cloths, made of sheep wool, in wooden or

steel cupboards. This widespread approach, termed 'commonsense life style solution' in local parlance, is based upon the local method of storing foodstuffs. While no data have been colligated so far to validate this methodology, Spiti's inhabitants report that their food, stored in such conditions, does not spoil or mildew. Patient preference is for pens, which 'pain less' and are 'easy to carry'. Most persons with diabetes maintain good glycaemic control, thus supporting the rationale for such insulin storage practices.

Insulin disposal, too, may be difficult in winter. Our patients keep their used disposable ancillary supplies at home, and intermittently utilise disposal devices available at government health centres More research, and best-practice sharing, is required to ensure optimal use of insulin in persons with diabetes living in extremely cold climates. There is a need to objectively determine the potency and efficacy of insulin stored in such a manner, to be able to make evidence-based recommendations for other cold regions with resource constraints.

Associate Professor Jatinder Mokta
Department of Medicine, Indira Gandhi Medical College, Shimla, India
Dr Sanjay Kalra
Department of Endocrinology, Bharti Hospital, Karnal, India

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