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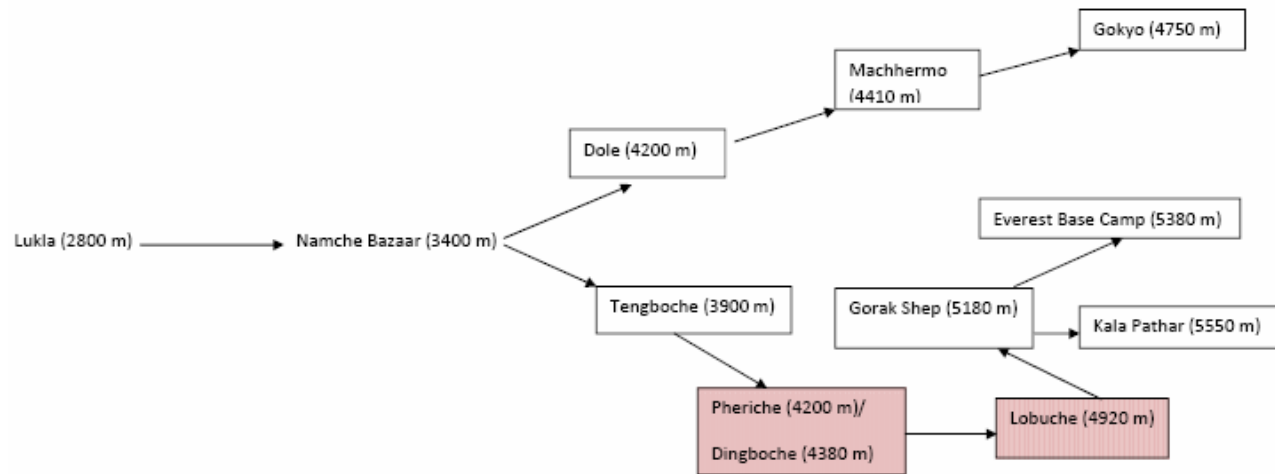
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CLINICIAN'S CORNER

Doing High Altitude Research in the Himalayas

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Sketch map of the Everest region with the study sites shown in pink shade. Lukla is the main airport for the region.

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Pheriche, a small hamlet is an important settlement on the trekking route to the Everest Base Camp (EBC) in the Khumbu region of Nepal. The settlement is the location of the Himalayan Rescue Association (HRA) clinic which was started way back in 1973. Today the clinic is well equipped and handles mainly altitude related illnesses. Oxygen concentrators, Gamow bags, huge solar panels and a windmill to provide electricity and a satellite phone are the main facilities.

We were staying in Pheriche for over a month. We were a multinational team of doctors, nurses, echo technicians and physician assistants conducting a clinical trial in the khumbu region. The team had members from Nepal, Indians working in Nepal, the United States and the United Kingdom. The Nepalese members were from the Mountain Medicine Society of Nepal (MMSN). Dr. Jenny Hargrove from the Stanford University in the States was the team leader. The study was approved by the Institutional Review board of the Stanford University and the Nepal Health Research council. Dr. Buddha Basnyat of Nepal was the principle investigators and we were acting as study coordinators.

It is an ascent of over 700 m from Pheriche to Lobuche and certain trekkers break the journey at Dughla. There is however, only one small lodge at Dughla and most trekkers continue straight to Lobuche. The Khumbu region with an average altitude of around 3400 m pushes trekkers to their limits and altitude sickness is not uncommon. High altitude pulmonary edema (HAPE) and high altitude cerebral edema (HACE) are occasionally seen. These days with better medical facilities and helicopter evacuation the mortality has decreased. Doctors have also learned to better manage high altitude problems. We were studying whether the

prophylactic use of acetazolamide can prevent or reduce the incidence of HAPE.

We divided ourselves into two teams, one based at Pheriche and the other at Lobuche and the teams would swap after a fortnight. The volunteers for the trial were trekkers who were going towards Kala Pathar (a rock which offers a splendid view of Everest) and/or Everest Base Camp (EBC). The trekkers were explained the objectives of the study and were invited to participate. The risks and benefits of participating were explained and written informed consent obtained.

Table/Fig



1 Close up of Mount Everest

We did a Lake Louise scoring at Pheriche and again at Lobuche. A detailed examination of the lung fields and pulse oximetry was carried out. The lung fields and the heart were scanned using portable ultrasound scanners. Comet sign in the lung was taken as an early indication of fluid collection and the mean pulmonary artery pressure was measured as a wedge pressure. The study was approved by the Nepal Health Research Council and the Institutional Review Board of Stanford University in California, United States. The study was a double-blind, randomized clinical trial and there were two groups. One group received a sugar pill (placebo) while the other was put on acetazolamide. The drugs were in blister packs and the strength of the tablet was 250 mg for acetazolamide. We planned to have around 150 volunteers in each group. The data would be collected and then analyzed against a master list.

We flew into Lukla, a spectacular airport carved out of a hillside at around 2800 m. The airport was originally constructed by Sir Edmund Hillary's Himalayan Trust to supply material for the building of the Khunde hospital. The runway is only around 150 m long and one end is around 50 m higher than the other. During the peak trekking season, Lukla is the second busiest airport in Nepal after Kathmandu.

It was a long climb to Namche Bazaar (3400 m) the next day. Namche Bazaar is the unofficial capital of the Sherpa country and is a remarkable village. There are lodges to suit all pockets. The lodge building has however had a deleterious effect on the forest cover. The surrounding hills are bare and Namche faces a severe water shortage in summer.

Table/Fig 2



The Himalayas from Pheriche

Namche has pizza parlors, bakeries, internet cafes and shops selling handicrafts (most of them mass produced in China), woolen goods and mountain gear. There are some excellent book shops with an impressive collection on mountaineering. Syangboche situated on the crest of the hill surrounding Namche has one of the finest mountain views in the world. Himalayan giants like Kantega, Thamsarku, Ama Dablam, Lhotse, Nuptse, Kwangde and Everest seem to be within touching distance. The Everest View hotel is the highest three star hotel in the world and the view is unbelievable. We were putting up flyers advertising our study in various lodges and shops. We believe we had done a good PR job as most people we met at Pheriche were aware of the trial.

Tengboche on the saddle of a hill is the location of an important monastery which dominates the spiritual and religious life of the Khumbu. The Mani Rimdu dance in October-November is spectacular and on a previous

visit I was fortunate to have witnessed a performance. We gave medical help to locals and fellow trekkers when asked for. Luckily there were not many emergencies! Most of the ailments were minor and only required reassurance! As we trekked towards Pheriche the landscape became more barren. The Himalayan hotel at Pheriche is an excellent lodge and Nuru Sherpa, the owner soon became a good friend. Part of our team continued on to Lobuche and installed themselves at the Eco Lodge. Lobuche is spectacularly situated on the moraine of the Khumbu glacier but the quality of the lodges is notoriously poor! The Eco was a notable exception!

Table/Fig 3



The monument to climbers who lost their lives on Everest

Pheriche has a 'twin' village over the hill named Dingboche. Boche stands for flat land seen from a hill top. In the mountainous Khumbu flat land is a rarity and many of these became sites of human settlement. Dingboche receives more Sun and is warmer than cold and windy Pheriche. We stayed in Pheriche but two of us went over each afternoon to Dingboche.

The doctors at the Himalayan Rescue Association (HRA) aid post give a talk every afternoon on 'Staying well at altitude' at three in the Sun room of the clinic. We decided to help out. We started giving a similar talk at Dingboche. The talks especially the one at Dingboche were well attended and became the major recruiting ground for the study.

Recruiting at Pheriche and Dingboche was proving difficult. Trekkers sorted themselves into two groups – those who took acetazolamide for prophylaxis of altitude illness and those who did not. The former were already on acetazolamide by the time they reached Pheriche while the latter did not want to take medicines. The trail was technically double-blinded. However, in many cases the patients knew which group they were in because of the tingling and numbness produced by the drug.

Our days at Pheriche began to follow a set routine. The mornings were spent lazing around in the Sun room. The lodge had an excellent collection of books to while away the time. After lunch we did the lodge rounds talking about the study and signing up interested volunteers. It was cold and the rooms were not heated making it difficult for us to examine the volunteers. Doing echos at Lobuche was very difficult. The team treated trekkers and handled emergencies at Lobuche.

Table/Fig 4**Putting up flyers about the trial**

We also went for treks to EBC, Kala Pathar and the upper Imja Khola valley. It was a month spent in a peaceful and rugged land which is however slowly getting commercialized. It was a delightful experience being a part of one of the 'highest' clinical trials in the world!

The other members were Dr. Soni Srivastava, Dr. Komal Kaul and Dr. Asmita Poudel from the Institute of Medicine (IOM), Kathmandu, Nepal. We had a preponderance of young ladies. Anna from the United Kingdom was our echo technician. The male members were Dr. Ram Hari Ghimire and Dr. Kshitiz Alekh from the IOM. There were other American volunteers and we had a separate team for November.