Nepalese teeth to uncover origins of birth defects

Daniel Zimmermann

HONG KONG/LEIPZIG, Germany: The remote village of Jiri in Nepal is just a regular stop-over for trekkers on their way to Mount Everest. For Prof. Richard J. Sherwood from Dayton in the US, however, the small group of natives living there could hold the key to understanding the origin of common birth defects such as cleft lip or palate. In a field study, the anthropologist and biomedical expert is currently examining the teeth of hundreds of villagers, which, according to him, could explain why the early development of facial features can go seriously wrong.

The reason Prof. Sherwood chose such a remote place for his study was pragmatic. The population of Jiri has been part of several biomedical studies since the 1980s and, therefore, much of the groundwork, including genotyping by blood sampling, has already been done. In addition, the local ethnic group in Jiri, the Jirels, have a homogeneous diet and have never received orthodontic care, which are two factors important for studying natural variations in the craniofacial apparatus, Prof. Sherwood says.

In order to obtain data quickly, he set up a small dental clinic in the village in January last year, where local staff takes traditional dental casts and sends them to the US regularly. At Wright State University in Dayton, they are digitally scanned and examined further. Prof. Sherwood visits the site himself two or three times a year. According to him, there are over 15 people working on the project including a dentist, dental assistant and physician in Nepal. "Before we established the dental clinic, there was no local dentist and most people had never seen a dentist in their life," he says. "Participants are given a tooth cleaning and general oral exam as part of our study. We also provide some services, such as fillings, free of charge."

A pilot study back in 2005 produced 200 impressions, however, Prof. Sherwood told Dental Tribune Asia Pacific he is aiming to take samples from at least one-fifth of Jiri’s current population—about 1,500 people—until funding runs out in 2012. His study has received more than US$2 million from the National Institute of Dental and Craniofacial Research, a US federal agency, based near Washington, DC, and part of the National Institutes of Health, which supports research with the potential to improve oral, dental or craniofacial health.

Prof. Sherwood intends to publish preliminary results next year. Through the study of normal variation, he hopes to determine the chromosomal regions that could explain why cleft palates develop differently, as well as gain new insights into other dental conditions, such as crowding.

According to the American Speech-Language-Hearing Association, one out of every 700 newborns (more than 6,000) in the US is affected by cleft lip and/or palate each year. In less developed countries like China, reports suggest that tens of thousands are affected, most of which are left untreated, leading to death or, in the majority of cases, lifelong impairments. Besides genetics, the condition has also been linked to the mother’s poor health habits, such as smoking, or environmental factors, including exposure of the foetus to drugs, pesticides or radioactivity.

"Abnormalities can be thought of as the extreme ends of the normal distribution in a trait but even relatively minor conditions, for example malocclusions, may have a significant impact on the psychological well-being of individuals if they feel self-conscious about how they look," Prof Sherwood concludes. "If we are able to identify the genetic influences on normal variation it will, of course, have implications on the study of facial abnormalities."

Prof. Richard J. Sherwood examining a dental cast in the Jiri Dental Study lab.

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