

A study has found that those people who feel enthusiastic and cheerful, exhibiting what psychologists term, 'positive affect', are less likely to they age. In the study, published in the journal Psychological Science, the researchers analysed 991 middle-aged and older U.S.



Tasting tentacles

Harvard University researchers have found the mechanism of how octopuses touch and taste with their tentacles while foraging. The first layer of cells in the suction cups have chemotactile receptors that have adapted to sense molecules that do not dissolve in water. So the animal figures out whether it is a prey it is

Delivery of COVID-19 vaccines poses a huge challenge

Most of the COVID-19 vaccines, the RNA vaccines in particular, require –70 degrees C to –80 degree C cold-chain

R. PRASAD

The government recently said it will procure the vaccine and distribute it under a special COVID-19 immunisation programme to four categories of people, free-ofcharge. The priority groups named are healthcare professionals including doctors, nurses and ASHA workers, a second category that includes frontline workers including police and armed forces, the third category of those aged above 50 and finally those below 50 years of age with co-morbidities.

"All of those sounds like a simple rank-ordering, but it is not. Hard choices may need to be made. For example, when there is insufficient supply to offer vaccines to all who would otherwise qualify, which group will be prioritised?" asks Dr. Gagandeep Kang, Professor of microbiology at CMC Vellore in an email to The Hindu.

Deciding whom to vaccinate first may be dictated by the characteristics of the vaccines that become initially available, such as the ones that are more effective in the younger population than in older people. "Should we then not vaccinate the elderly? Is there a bar below which vaccines should not used in a particular group? As soon as we move beyond the big picture characterisation of initial priority groups, there are more questions for discussion than clear answers," she says.

Ultralow temperatures

But a bigger challenge comes in the form of keeping the vaccines at ultralow temperatures during distribution. Most of the COVID-19 vaccines, the RNA vaccines in particular, that are in the advanced stage of Phase-3 trials require -70 degrees C to -80 degree C cold-chain. The Ebola vaccine, too, requires the same kind of cold storage. "This kind of storage was difficult to establish in West Africa, but was managed on the scale needed for Ebola - which is in the hundred thousand doses range," Dr. Kang recalls. "But when we need tens and hundreds of millions of doses, I do not know how feasible that will be in the U.S. or UK, let alone in India."

Attempts are being made to modify the vaccines and increase their stability to suit the storage conditions that already exist in many parts



Easy to handle: The Oxford vaccine does not require ultracold temperatures. Hence, the existing system used in the routine immunisation programme may be able to handle the Vaccines. ■ GETTY IMAGES

of the world. But they are unlikely to become available in the first-generation vaccines.

Resources needed

"In India we have never had this kind of storage requirement and building the infrastructure for ultracold storage requires considerable resources, because you need not just the freezers, but also uninterrupted power supply," Dr. Kang says. "I think we may need to decide

whether vaccines that require this form of storage should be used only in cities where such facilities can be built. It may make sense to even think about bringing people to the vaccine, instead of taking the vaccine to people in some settings."

Hence, the decision to use a COVID-19 vaccine will need to take into consideration logistics and infrastructure needed to distribute and deliver vaccines, which goes

beyond financial resources to purchase vaccines.

The Oxford vaccine does not require ultracold temperatures, and hence, the existing system used in the rouimmunisation programme may be able to handle the vaccines.

The next biggest challenge might be in vaccinating people with two doses four weeks apart during the pandemic. Most of the vaccines at advanced stages of Phase-3

trial use two doses of the vaccine to achieve best results. But Dr. Kang does not foresee much problem here. "Vaccinating twice one month apart is something we know and have done for polio programmes for well over a decade. Although oral vaccines are much easier to deliver than injectable vaccines, the logistics of storage, transport and delivery are similar," she says. "For injectable vaccines where two doses need to be given three or four weeks apart, we will need to learn from our experience with polio and measles-rubella campaigns."

Children and adults

While the national immunisation programme is limited to vaccinating children, CO-VID-19 vaccination will be across age groups, including older people. It remains to be seen how well the lessons learnt from the national immunisation programme can be replicated for other age groups.

With vaccines seen as one sure way to end the pandemic if 60-70% of the population is vaccinated, the question of making the vaccines available for free gains importance. But that does not rule out the possibility of selling them when vaccines become available in plenty even while they are available for free. "Initially, I assume vaccines should be prioritised for groups as identified by the government, which might mean that all vaccines are only available in the public sector, at least when supplies are limited" she says.

Buying vaccines

There is a possibility of the

government allowing companies to purchase vaccines to maintain business continuity. Probably, other groups that might be willing to pay for vaccines might also become eligible to buy vaccines. "Any vaccines being diverted at a time when supply is limited deprives priority groups, so perhaps another way to think about this, is that certain types of vaccines that are unsuitable for public programmes in India because of expense or cold chain requirements, might be opened up for purchase by companies, organisations and individuals as a premium product," says Dr. Kang. "All this is ethically contentious, and needs discussion. There are no easy decisions

Ancient skeleton offers clues on prehistoric era

The severely eroded teeth indicate a fibre-rich, grain diet

AGENCE FRANCE-PRESSE

German researchers are piecing together the life of a prehistoric woman who died more than 5,000 years ago in the Neolithic period, after her skeleton was found when excavating for wind turbines.

The "Lady of Bietikow," as she has been named, was found near a village of the same name in northeastern Germany's Uckermark

Investigations have shown that she was between 30 and 45 years old and died more than 5,000 years ago.

during the same period as Oetzi the Iceman, the stunningly preserved corpse found by tourists in the Alps in the 1990s.

"You can compare Oetzi and the Lady of Bietikow in terms of age," said Philipp



Tell-tale remains: Discovered in northern Brandenburg, this skeleton of a woman is thought to be 5,000 years old. • AFP

Roskoschinski, one of the two archaeologists who made the discovery.

All that is left of the skeleton are bones and some frag-

It was during the Neolithic period that humans first introduced grains into their diet, since they could be stored more easily than meat and could also be used as a means of payment, according to anthropologist Bettina

However, this led to a deterioration in people's general health. This can be seen in the state of the Lady of Bietiverely eroded and missing completely in some places, Jungklaus said.

It remains unclear whether the condition of the Lady of Bietikow's teeth indicates an illness or even the cause of her death

Lessons from Ladakh's glacial lake outburst

The cause was not spillover but rather a tunnelling drainage process

ASWATHI PACHA

In August 2014, a glacial lake outburst flood hit the village of Gya in Ladakh, destroying houses, fields and bridges. Using remote sensing data, researchers from Germany have mapped the evolution of Gya glacial lake and note the cause of the flood. In a paper recently published in Natural Hazards, the team notes that this case study "illustrates the problem of potentially hazardous lakes being overlooked."

How it happened

Most interesting was finding the cause of the flood – it was not a spillover but rather a tunnelling drainage process. "Imagine a bucket full of water. It can overflow when you drop a stone, or the water can drain if there is a hole under the bucket. Similarly, here the flooding did not happen due to the spillovers due to an avalanche or

landslide, rather there was a thawing of the ice cores in the moraine [a field of dirt and rocks that have been pushed along by the glacier as it moves] which drained through the subsurface tunnels," explains Ravi Baghel from the South Asia Institute, Geography department, Heidelberg University, and an author of the paper.

Future speeding

The team notes that such thawing of ice cores may accelerate in the future due to global climate change, and there is an urgent need to use multiple methods for better risk assessment and early warning.

"It is almost ce other glacial lake outburst floods will happen all over the Indian Himalaya. However, not all of these events have catastrophic outcomes. It largely depends on urban planning, the size of the lake, the distance between



and there is an urgent need of better risk assessment and early warning. • MARCUS NÜSSER

the lake and affected villages, the valley section and some more aspects. In some cases, cloudbursts can also trigger glacial lake outburst flood events like in the Kedarnath disaster in 2013," explains the lead author Marcus Niisser from the Heidelberg Centre for the Environment in an email to The Hindu. He adds that in different

sections of the Himalaya the occurrence of such floods has received different atten-

"While these events have been regarded as a major risk in the central Himalayan region including Sikkim, the arid Trans-Himalayan regions of Ladakh have received attention only recently. Here the glaciers are located at high altitudes not lower than 5,200 m and most glaciers are of small size. Likewise, the glacial lakes are quite small in size. In the case of the Gya lake at 5,400 m, the lake is almost always ice-covered, even

during summer," writes Dr.

Nüsser.

Monitoring lakes

The team adds more bathymetric studies are needed to analyse lake volumes, and it is important to regularly monitor lake development and dynamics. New, sophisticated technologies can also be put to use to understand the stability of the moraines that dam the lake. "However, it is definitely not only a question of technology but also of land use planning and accessibility," he concludes.

Soak in the Sun, sleep early and tight to avoid myopia

At this rate, by 2050, 64 million children in urban India may have myopia



D. BALASUBRAMANIAN

Myopia or shortsightedness is turning out to be an epidemic across India, and indeed even more in Southeast Asia. It occurs because of the potential role of myopic genes and also local environmental conditions such as the prolonged 'near work' and/or less sunlight exposure, and not because of any infection due to harmful germs. It will not become a worldwide pandemic, as CO-VID-19 has. Yet, drastic changes in lifestyle (becoming more indoor-centric) and the timing and levels of sunlight we receive, it is time to take measures to counteract myopia, which may well become a global pandemic.

What is myopia?

Myopia occurs when the eyeball becomes longer, relative to the focusing power of the cornea and the lens; this leads to focus not on the surface of the retina, but at a point before it. This leads you to find it difficult to focus distant objects clearly, though you can see close-up objects such as while reading and using the computer use (allaboutvision.com). In the year 2000, about 25% of the world's population was nearsighted or myopic, but it is expected to increase to above 50% by 2050 (30 years from now).

Dire predictions Based on the current increasing prevalence of myopia in India, scientists from the L.V. Prasad Eye Institute (LVPEI) predict that 64 million children (aged 5-15 years) living in urban regions of the country alone will have myopia by the year 2050, if no interventions are made to control it. While many factors are known to counteract this problem, recent studies indicate less time spent outdoors to be a risk factor for myopia. Ambient levels of light during daytime tend to be over 10 to 100 times brighter than that indoors. There are various ways in which such outdoor brightness helps protect the human eye from becoming myopic. (1) If you



Young achievers: There is a need for awareness among parents to control the use of near-vision devices such as smartphones.

are in an open space, and not performing any 'near work', the stress on the eye is reduced. (2) Outdoor environment provides equal optical stimuli to various parts of the peripheral retina (the posterior part of the eye) and also enables exposure to different colours (the so called VIB-GYOR) equally well, while indoor lighting using artificial sources that cut off specific wavelengths. (3) Upon bright illumination in sunlight, the pupil reduces its size and reduces blur, and increase the depth of focus. (4) Sunlight exposure helps the biology of the eye, helping it to produce more vitamin D. (5) Exposure to bright light releases the hormone dopamine, which controls the length of the eye ball; the shorter it is, myopia might set in. (In this connection, see Rohit Dhakal

and Pavan K. Verkicharla: "Increasing time in outdoor environment could counteract the rising prevalence of myopia in Indian school-going children", Current Science, 119,1-4, 2020).

Intense educational pressure from the family and teachers to achieve academic excellence, excessive homework, attending coaching classes (invariably held late in the evening, or before school timing for entrance exams) rob high school children of sunlight, leading to the myopia epidemic becoming an endemic, and a subglobal pandemic in Central and East Asian subcontinent.

Policy suggestions

Rohit Dhakal and Pavan Verkicharla (myopia researchers from LVPEI) have made some obvious and public health policy suggestions, which can be implemented right away, particularly now that we have the National Education Policy getting ready for implementation.

These are: Mandatory 60 minutes of recess time in all schools during the school hours every day, by locking the classrooms to keep the students in sunlight, starting from primary level to the high schools. Have a structured recess time incorporated into all their curricula. Make it mandatory for schools to have enough space for playgrounds. Create public awareness among parents about the importance of proper eyesight and control the use of nearvision devices such as smartphones. Recommend/promote community centres in each locality to organise outdoor programmes weekly or

at least twice a month.

Many reasons All these are obvious and yet not followed, due to economic, financial, real estate and sociological reasons. But at least schools and colleges in the hands of the State and Central governments should attempt to do so. The future stares at us - lest we become short-sighted or myopic in more than one sense.

Even as I write, comes a new publication which says that suggests that sleeping late is a risk factor for myopia development amongst school-aged children in China (X N Liu et al.; Scientific Reports (2020) 10:17194 https://doi.org/10.1038/

s41598-020-74348-7. They point out that years of study have identified a number of risk factors for myopia, such as family history, genetics, urban living environment. Recent studies also indicate that shorter sleep duration and poorer sleep quality are associated with the development of myopia. They disturb the circadian rhythm of the body, particularly in the brain, and also strain the retina. Thus, early to bed and deep sleep are preventive measures against the onset of myopia.

Again, we know that this, too, is becoming difficult with online teaching through web classes, and with the use of television as an instructive medium, particularly for poorer children in rural areas who do not have smartphones. While this may be inevitable during these lockdown days, it should not become an inevitable teaching method, and schools must reopen and conduct classes during daytime.

(I thank Dr. Pavan Verkicharla for sharing views and advice, and contributing to this article.)

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Bird brains can hold a lot

How different are the brains of birds from those of mammals?

Ravens recognise themselves in a mirror, and these birds are known to even plan for the future. Studies have shown that pigeons can be taught to recognise English wordslearn spellings.

Now, another study (Science, September 2020) shows that birds have a more organised brain than previously thought. The cognitive skills of mammals are related to the cerebral cortex. But birds don't have this cerebral cortex, they have a region called the pallium, and studies on this region have now revealed new information on its architecture.

Using a special technique, the team studied the orientation of individual nerve fibres in the brains of 42 homing pigeons, nine barn owls, a rat, a vervet

monkey and one human. They found that the brains of the birds had an organisation similar to mammalian brains. The fibres were arranged horizontally and vertically, just like in the neocortex region of the mammal brain. Another study to examine the interconnection of cells in the sensory areas of bird brain found connections similar to mammal brains.

According to the researchers led by Martin Stacho from Ruhr-University Bochum, Bochum, Germany, there is a



possibility that mammals and birds independently developed similar microcircuits by convergent or parallel evolution. The study addresses how mammals and birds show such similar perceptual and cognitive feats.

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