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VEPACHEDU EDUCATIONAL FOUNDATION

The Telangana Science Journal

Health and Nutrition

TIACS-subscribe@yahoo.com (The Indian American Chemical Society)

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Superbugs¹

For nearly a century, bacteria-fighting drugs known as antibiotics have helped to control and destroy many of the harmful bacteria that can make us sick. But in recent decades, antibiotics have been losing their punch against some types of bacteria. In fact, certain bacteria are now unbeatable with today's medicines. Sadly, the way we've been using antibiotics is helping to create new drug-resistant "superbugs²." Only 34 countries have plans in place to tackle antibiotic resistance and prevent superbug infections³. Key findings of the report include:

- Few countries (34 out of 133 participating in the survey) have a comprehensive national plan to fight resistance to antibiotics and other antimicrobial medicines.
- Monitoring is key for controlling antibiotic resistance, but it is infrequent. In many countries, poor laboratory capacity, infrastructure and data management are preventing effective surveillance, which can reveal patterns of resistance and identify trends and outbreaks.
- Sales of antibiotics and other antimicrobial medicines without prescription remain widespread, with many countries lacking standard treatment guidelines, increasing the potential for overuse of antimicrobial medicines by the public and medical professionals.

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- Public awareness of the issue is low in all regions, with many people still believing that antibiotics are effective against viral infections.
- Lack of programs to prevent and control hospital-acquired infections remains a major problem.

Every year, about 2 million people get sick from a superbug and about 23,000 die, according to the CDC. It's a family of bacteria normally found in the gut. They can cause life-threatening blood infections. Healthy people usually don't get this type of infection. Most cases are in people who are in the hospital or a medical care facility, like a nursing home. The bacteria can be hard to remove from medical tools that are placed into the body, such as catheters, breathing tubes, or viewing scopes, even after cleaning.

Antibiotics are the foundation on which all modern medicine rests. But, the biggest risk factor is taking antibiotics indiscriminately. While antibiotics may cure the bacteria that are making you sick, the drugs can also knock out the healthy bacteria in your digestive tract.

Every year, hundreds of thousands of people get gonorrhea, infected by *Neisseria gonorrhoea*. Some people do not have symptoms. That means one can spread it without knowing. It used to be treatable with antibiotics. But the bacteria are becoming more resistant to current drugs.

Most people who get a *Clostridium difficile* infection are getting medical care. About 14,000 people a year die from it, most of them older adults. In severe cases, you may need surgery to remove part of the infected intestine.

Particles of the bacteria, called spores, can be left behind in bathrooms, on linens, or on clothing. They can be passed from person to person. In the past, doctors used antibiotics called fluoroquinolones to treat *C. difficile*. But these drugs don't always work. From 2000-2007, deaths spiked 400% when a new drug-resistant strain of *C. difficile* appeared.

Multidrug-Resistant *Acinetobacter* is a bacteria found in soil and water, which can also live on your skin for days. It doesn't always make you sick. A superbug strain that doctors worry about is *Acinetobacter baumannii*. People outside the hospital usually don't get sick from this germ. It's most often seen in people who are already ill and in the hospital for another reason, and having a breathing tube raises the risk.

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MRSA stands for methicillin-resistant Staphylococcus aureus. It is a type of bacteria that cannot be treated with penicillin. Many healthy people have staph on their skin and in their nose and it doesn't make them sick. But you can spread it to others. This infection most often happens to people in the hospital, often after surgery. It can infect a wound and spread to surrounding tissues and your blood. But new strains have emerged outside medical settings. There have been recent concerns about MRSA outbreaks among athletes, including in schools. The bacteria can spread easily with skin-to-skin contact. Your risk is higher if you have a cut. MRSA can cause life-threatening lung and blood infections. MRSA is a major problem, although there are pretty good drugs to treat it now. Rates of life-threatening MRSA have been declining thanks to improvements in medical procedures.

Benefits of True Bilingualism⁴

Seniors who have spoken two languages since childhood are faster than single-language speakers at switching from one task to another, according to a study published in the January 9 issue of The Journal of Neuroscience. , which found that compared to their monolingual peers, lifelong bilinguals also show different patterns of brain activity when making the switch. The value of regular stimulating mental activity across the lifetime by using two distinct languages (not the modern Anglicized language containing a mixture of both languages) is evident from this study.

Young adults did not show much difference in their ability of task-switching, indicating that bilingual seniors use their brains more efficiently than monolingual seniors. Speaking multiple languages on a daily basis is a good brain exercise that keeps your mind agile and efficient when you are old.

Bread Facts⁵

Bread from the grocery store will stay fresh for 2 to 4 days if you leave it on the counter. Bakery bread, which usually has fewer preservatives, will keep 1 to 3 days. If you want to store bread for a longer, put it in the freezer. It will stay fresh for 2 to 3 months. Putting bread in the fridge will actually make it go stale quicker.

Bagels are the only bread that's boiled before it's baked. Boiling gives traditional bagels their shiny, chewy crusts. Some companies steam their bagels instead of boiling them, however. How can you tell?

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Steamed bagels are puffier and softer. But you might want to be careful about how many you eat. Bagels can have a lot more calories than a slice of bread.

Green or black fuzzy spots on the piece of bread are mold, and it may have spread to other parts of the loaf; therefore, the bread loaf should be thrown away, not just the piece having the spots of mold. There are a few different kinds of mold that pop up on bread. The blue-gray-green fuzzy mold is the same fungus that can produce penicillin.

Blood sugar levels go up after eating foods that have carbohydrates such as bread. Whole-grain pumpernickel causes the lowest and gentlest change in blood sugar, while its digestion takes longer than other breads, beneficial for diabetics. The fiber in whole-grain breads can make you feel full longer and help control weight. To lose weight, eat less, exercise more, and eat healthy foods. When picking bread, look for 16 grams of whole grains in a serving. If you are buying bakery bread that doesn't have a label, pick it up to see how heavy it is. Heavier breads are usually higher in whole grains. In general, look for coarser, denser breads with a lot of grainy bits to avoid a spike in your blood sugar. Choose whole-grain breads with at least 3 grams of fiber a slice. If you buy "double fiber" bread, you'll usually be getting 5 to 6 grams of fiber a slice. Just make sure that your double-fiber bread is whole grain and that it doesn't have artificial sweeteners in it.

"White" whole wheat bread is made with flour from white wheat, not the red wheat most bread is made from. The bran of white wheat is lighter and has a milder flavor, which might make this bread taste better to some people. Experts consider white wheat and red wheat to be the same nutritionally. Gluten is a protein found in wheat, barley, and rye. People who are allergic to gluten should avoid breads and other foods made with those grains. Many gluten-free breads and mixes are made with white or brown rice flours and starches such as arrowroot, potato, and tapioca. Avoiding wheat can be hard. It's in most prepared foods and in some vitamins and lip balms.

Secondhand Smoke⁶

No level of secondhand smoke (SHS) exposure is safe. SHS exposure occurs when nonsmokers breathe in smoke exhaled by smokers or from burning tobacco products. It kills more than 400 infants and 41,000 adult nonsmokers every year. Exposure to SHS among US nonsmokers has declined, but progress has not been the same for everyone.

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Adult Vaccinations⁷

In October 2014, the Advisory Committee on Immunization Practices (ACIP) approved the Recommended Immunization Schedule for Adults Aged 19 Years or Older, United States, 2015.

This schedule provides a summary of ACIP recommendations for the use of vaccines routinely recommended for adults aged 19 years or older in two figures, footnotes for each vaccine, and a table that describes primary contraindications and precautions for commonly used vaccines for adults. Changes in the 2015 adult immunization schedule from the 2014 schedule included

the August 2014 recommendation for routine administration of the 13-valent pneumococcal conjugate vaccine (PCV13) in series with the 23-valent pneumococcal polysaccharide vaccine (PPSV23) for all adults aged 65 years or older⁸, the August 2014 revision on contraindications and precautions for the live attenuated influenza vaccine (LAIV)⁹, and the October 2014 approval by the Food and Drug Administration to expand the approved age for use of recombinant influenza vaccine (RIV)¹⁰. These revisions were also reviewed and approved by the American College of Physicians, American Academy of Family Physicians, American College of Obstetricians and Gynecologists, and American College of Nurse-Midwives.

Vaccination coverage levels among adults are low. Improvement in adult vaccination is needed to reduce the health consequences of vaccine-preventable diseases among adults. Successful vaccination programs combine 1) education of potential vaccine recipients and publicity to promote vaccination, 2) increased access to vaccination services in health care settings, and 3) use of practices shown to improve vaccination coverage, including reminder-recall systems, efforts to remove administrative and financial barriers to vaccination, use of standing order programs for vaccination, and assessment of practice-level vaccination rates with feedback to staff members (4). Health care provider recommendations for vaccination are associated with patients' receipt of vaccines. Routine assessment of adult patient vaccination needs, recommendation, and offer of needed vaccinations for adults should be incorporated into routine clinical care of adults (4,5). The adult immunization schedule (2), updated annually, provides current recommendations for vaccinating adults and a ready resource for persons who provide health care services for adults in various settings.

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Details on these updates and information on other vaccines recommended for adults are available under Adult Immunization Schedule, United States, 2015, schedules and in the Annals of Internal Medicine¹¹.

Hypertension¹²

When pressure of blood against the walls of arteries is too high, known as hypertension or high blood pressure, it raises the heart's workload and can cause serious damage to the arteries. Uncontrolled high blood pressure increases the risk of heart disease, stroke, and kidney disease. High blood pressure is sometimes called a silent killer because it may have no outward symptoms for years. In fact, one in five people with the condition don't know they have it. Internally, it can quietly damage the heart, lungs, blood vessels, brain, and kidneys if left untreated. There is a strong correlation between changing lifestyle factors and increase in hypertension. It's a major risk factor for strokes and heart attacks today¹³.

Normal blood pressure readings should be below 120/80, while higher results over time can indicate hypertension. In most cases, the underlying cause of hypertension is unknown. The top number (systolic) shows the pressure when the heart beats. The lower number (diastolic) measures pressure at rest between heartbeats, when the heart refills with blood. Occasionally, kidney or adrenal gland disease can lead to hypertension. A hypertensive crisis can lead to a stroke, heart attack, kidney damage, or loss of consciousness. Symptoms of a hypertensive crisis can include a severe headache, anxiety, nosebleeds, and feeling short of breath.

Cardiovascular diseases account for a large proportion of all deaths and disability worldwide. Global Burden of Disease Study reported that in 1990, there were 5.2 million deaths from cardiovascular diseases in economically developed countries and 9.1 million deaths from the same causes in developing countries¹⁴. Cardiovascular diseases caused 2.3 million deaths in India in the year 1990 and this was projected to double by the year 2020. Hypertension is directly responsible for 57% of all stroke deaths and 24% of all coronary heart disease deaths in India¹⁵. The Centers for Disease Control and Prevention (CDC) estimate about one in three Americans have hypertension¹⁶.

Up to the age of 45, more men have high blood pressure than women. It becomes more common for both men and women as they age, and more women have hypertension by the time they reach 65. People, who have diabetes or a close family member with high blood pressure or diabetes, have greater risk. About 60% of people with diabetes have high blood pressure.

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African-Americans are more likely to develop hypertension and to develop it at a younger age. Genetic research suggests that African-Americans seem to be more sensitive to salt. Diet and excessive weight can play a role, as well. Sodium, a major component of salt, can raise blood pressure by causing the body to retain fluid, which leads to a greater burden on the heart. The American Heart Association recommends eating less than 1,500 milligrams of sodium per day. Processed foods make up the majority of American sodium intake. Canned soups and lunch meats are prime suspects.

Stress can make one's blood pressure spike, but there's no evidence that it causes high blood pressure as an ongoing condition. However, stress may affect risk factors for heart disease, so it may have an indirect connection to hypertension. Stress may lead to other unhealthy habits, such as a poor diet, alcohol use, or smoking, which can contribute to high blood pressure and heart disease.

Being overweight places a strain on the heart and increases your risk of high blood pressure. That is why diets to lower blood pressure are often also designed to control calories. They typically call for cutting fatty foods and added sugars, while increasing fruits, vegetables, lean protein, and fiber. Even losing 10 pounds can make a difference.

Drinking alcohol can increase blood pressure. Gestational hypertension is a kind of high blood pressure that occurs in the second half of pregnancy. Without treatment, it may lead to a serious condition called preeclampsia that endangers both the mother and baby.

Four weeks is enough time to achieve some big improvements in your heart health¹⁷. You may be able to lower your blood pressure by simply switching to a better diet. The Dietary Approaches to Stop Hypertension involves eating more fruits, vegetables, whole-grain foods, low-fat dairy and nuts. You should eat less saturated fats and sweets. Reducing sodium in the diet can also have a significant effect. Regular exercise helps lower blood pressure. Adults should get about 150 minutes of moderate-intensity exercise every week. That could include gardening, walking briskly, bicycling, or other aerobic exercise. Muscle-strengthening activities are recommended at least two days a week and should work all major muscle groups.

Meditation can put the body into a state of deep rest, which can lower blood pressure. Yoga, tai chi, and deep breathing also help. These relaxation techniques should be combined with other lifestyle changes,

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such as diet and exercise. Be aware that herbal therapies may conflict with other drugs you take, and some herbs actually raise blood pressure. Tell your doctor if you take herbal or other dietary supplements. Hypertension is often a life-long condition. It's important to take your medications and continue to monitor your blood pressure. If you keep it under control, you can reduce the risk of stroke, heart disease, and kidney failure.

Our Interesting Hands

1. Fingernails grow about twice as fast as toenails, at 3.47 millimeters per month compared with 1.62 millimeters per month. After death, the corpse's nails become longer than before death. Dehydration causes a corpse's skin and soft tissues to shrink, making the nails look longer; No, they don't grow after we die. Our nails don't have sensation, but the nail bed is packed with nerve endings and blood vessels. That's why a tap on the nail is felt below.
2. If we position our hands correctly on the keyboard, our left hand will do 56% of the work.
3. Broken pinkies make up about one-third of all hand fractures in adults, because the pinky isn't as protected hanging out there on the end, and the bone is about the width of a pencil.
4. Even though most of our body's moving parts have muscles, our fingers don't. They're moved by muscles in the wrist, palm, and forearm that are attached to tendons, or tough bands of connective tissue, in our fingers.
5. A thumb that can be placed opposite the fingers of the same hand is an opposable thumb which allows the digits to grasp and handle objects and is characteristic of primates, not us alone. Opossums have opposable thumbs, too. Most apes and monkeys can touch their thumbs to their other fingers. We can move our thumb farther across hand than a non-human primate can. The opposable thumb allows us to use tools.
6. The difference is determined by sex hormone testosterone early on during a baby's growth in the womb. For that reason, most men have longer ring fingers, while the opposite is true for many women.
7. Cracking fingers is annoying to many who are not cracking. So, the myth that cracking causes arthritis, because they couldn't stand the irritating sound of cracking. The popping noise is the bursting of small gas bubbles in the joint and there is no link between the habit and stiff and painful joints or arthritis, say the scientists.
8. The percentage of chance for right-handed parents to have a left-handed child is about 10%, not 25%, because it is a complicated science, beyond genetics of dominant/recessive genes.¹⁸.

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Scientists think hand preference stems from genetics, hormones, and development. Two left-handed parents are about 30% to 40% likely to have a left-handed child, not 100%.

Source: The primary sources cited above, New York Times (NYT), Washington Post (WP), Mercury News, Bayarea.com, Chicago Tribune, USA Today, Intellihealthnews, Deccan Chronicle (DC), the Hindu, Hindustan Times, Times of India, AP, Reuters, AFP, womenfitness.net, about.com etc.

Om! Asatoma Sadgamaya, Tamasoma Jyotirgamaya, Mrityorma Amritamgamaya, Om Shantih, Shantih, Shantih!
(Aum! Lead the world from wrong path to the right path, from ignorance to knowledge, from mortality to immortality, and peace!)

¹ <http://www.webmd.com/news/20150417/superbugs-what-they-are>

Brian K. Coombes, PhD, Canada Research Chair in Infectious Disease Pathogenesis, McMaster University, Ontario, Canada.

Familydoctor.org: "Clostridium difficile Infection."

CDC: "Clostridium difficile Infection."

Stephen Calderwood, MD, president, Infectious Diseases Society of America; chief of infectious diseases, Massachusetts General Hospital, Boston. Tripathi, P. Advanced Biomedical Research, Jan. 9, 2014. CDC: "Acinetobacter in Healthcare Settings." The White House: "National Action Plan For Combating Antibiotic-Resistant Bacteria." News release, The White House. Eric Biondi, MD, pediatric hospitalist, University of Rochester Medical Center, Rochester, NY. CDC: "Carbapenem-resistant Enterobacteriaceae in Healthcare Settings." CDC: "Gonorrhea - CDC Fact Sheet." CDC: "Facts about C. diff." CDC: "General Information About MRSA in Healthcare Settings." CDC: "STDs and HIV - CDC Fact Sheet." Miller, K. American Family Physician, May 15, 2006. CDC: "Prevention Information and Advice for Athletes." American Society for Gastrointestinal Endoscopy: "FDA Issues Important Safety Communication: Design of Endoscopic Retrograde Cholangiopancreatography (ERCP) Duodenoscopes May Impede Effective Cleaning"

² Stop the Spread of Superbugs: <http://newsinhealth.nih.gov/issue/feb2014/feature1>

³ WHO report finds systems to combat antibiotic resistance lacking: <http://www.who.int/mediacentre/news/releases/2015/antibiotic-resistance-lacking/en/>

⁴ Lifelong Bilingualism: <http://chicagosfn.org/news/article/77>

⁵ Bread: http://www.webmd.com/food-recipes/rm-quiz-bread-facts?ecd=wnl_day_020715&ctr=wnl-day-020715_nsl-ld-stry_1&mb=s10u26bW4bX4A6f2oTmCQ%40HnVev1imbCifxQ3xyXZ4k%3d

⁶ Secondhand Smoke: http://www.cdc.gov/tobacco/basic_information/secondhand_smoke/index.htm;

http://www.cdc.gov/tobacco/data_statistics/fact_sheets/secondhand_smoke/health_effects/index.htm;

⁷ Adult Vaccinations: <http://www.cdc.gov/mmwr/pdf/wk/mm6404.pdf>

⁸ Tomcsyk S, Bennett NM, Stoecker C, et al. Use of 13-valent pneumococcal conjugate vaccine and 23-valent pneumococcal polysaccharide vaccine among adults aged ≥65 years: recommendations of the Advisory Committee on Immunization Practices (ACIP). MMWR Morb Mortal Wkly Rep 2014;63: 822–5.

⁹ Grohskopf LA, Olsen SJ, Sokolow LZ, et al. Prevention and control of seasonal influenza with vaccines: recommendations of the Advisory Committee on Immunization Practices (ACIP)—United States, 2014–15 influenza season. MMWR Morb Mortal Wkly Rep 2014; 63:691–7.

¹⁰ Food and Drug Administration. October 29, 2014 approval letter—Flublok. Silver Spring, MD: US Department of Health and Human Services, Food and Drug Administration; 2014. Available at <http://www.fda.gov/biologicsbloodvaccines/vaccines/approvedproducts/ucm421396.htm>.

¹¹ Kim DK, Bridges CB, Harriman KH. Advisory Committee on Immunization Practices recommended immunization schedule for adults aged 19 years or older: United States, 2015. Ann Intern Med 2015; 162:214–23.

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The full ACIP recommendations are available at: <http://www.cdc.gov/vaccines/hcp/acip-recs/index.html>.

¹² What is hypertension? What causes hypertension? <http://www.medicalnewstoday.com/articles/150109.php>

¹³ High BP: <http://link.springer.com/article/10.1007%2Fs11906-013-0340-9#page-1>

¹⁴ Murray CJL, Lopez AD. Mortality by cause for eight regions of the world: Global Burden of Disease Study. Lancet 1997; 349: 1269–1276.

¹⁵ India: <http://www.nature.com/jhh/journal/v18/n2/full/1001633a.html>

¹⁶ High blood Pressure: <http://www.cdc.gov/bloodpressure/>

¹⁷ Healthier Heart: http://www.cdc.gov/salt/healthy_heart_tips.htm

¹⁸ **Dominant/Recessive Genes:** All life forms, including but not limited to sexually reproducing animals like us, have genes, two copies of each gene in diploid state (http://www.diffen.com/difference/Diploid_vs_Haploid). We have 46 (23 pairs of) chromosomes carrying genes. One should not confuse genes with chromosomes or with DNA in the chromosome. Gene is a fragment of a huge DNA molecule (a polymer of four nucleotides, <http://www.lifetechnologies.com/us/en/home/references/ambion-tech-support/rna-tools-and-calculators/dna-and-rna-molecular-weights-and-conversions.html>; in a double helix form: http://geneed.nlm.nih.gov/topic_subtopic.php?tid=15&sid=16) and is the fundamental unit of inheritance that encodes a complete peptide that is vital to the organism, through the processes of transcription and translation. Contrary to earlier outlandish estimates, human genome may have less than 20,000 genes, while a water flea has 31,000 genes (<https://medium.com/the-physics-arxiv-blog/human-genome-shrinks-to-only-19-000-genes-21e2d4d5017e>); each gene having two alleles. The differences in alleles can cause variations in the protein that's produced, change protein production or no production at all. Proteins are the basis for all traits and metabolism, so variations in protein activity or expression can produce different phenotypes. However, a gene may encode several proteins and as result impact as many phenotypes. In general, a dominant allele produces a dominant phenotype in individuals who have one copy of the allele, which can come from just one parent, and for a recessive allele to produce a recessive phenotype, the individual must have two copies, one from each parent. Thus, individuals showing dominant phenotype may have one dominant and one recessive allele for a gene, they are generally considered "carriers" of the recessive allele, not visible without genetic testing; the recessive allele is there, but the recessive phenotype is not. This is what Mendel hypothesized based on his experiments on peas - in a cross between two pure-bred parents with different traits like seed color, the hybrid offspring would have both the gene alternates for green and yellow seed color - and reasoned that the dominant trait is seen whenever a single copy of its gene is inherited. When he crossed the hybrid offspring, green seeds reappeared in the next generation. Mendel reasoned that the "recessive" green trait is shown only when a copy of the recessive gene form is inherited from each parent, i.e., two copies of the same allele should be there for it to show up as a phenotype. However, that does not mean that there is no impact of the so-called recessive gene single allele with its so-called dominant counter-part present. For example, sickle-cell disease is an inherited condition that causes pain and damage to organs and muscles. Instead of having flattened, round red blood cells, people with the disease have stiff, sickle-shaped cells that get caught in capillaries, where they block blood flow to vital organs, and organ cells don't get enough oxygen and nutrients, and they begin to die. Only individuals with two copies of the sickle-cell allele have the disease due to a lot of such sickle cells, while people with just one copy are healthy due to lesser number of deformed cells – not enough to cause the disease. In addition to causing the disease, the sickle-cell allele makes people who carry it resistant to malaria, a serious illness carried by mosquitoes. Malaria resistance has a dominant inheritance pattern: just one copy of the sickle cell allele is enough to protect against infection. Therefore, people with one allele of sickle cells are healthy and immune to malaria, while people with two sickle cell alleles get sick, but they are immune to malaria. <http://ghr.nlm.nih.gov/handbook/inheritance/inheritancepatterns>; <http://learn.genetics.utah.edu/content/inheritance/patterns/>; <http://www.nature.com/scitable/topicpage/genetic-dominance-genotype-phenotype-relationships-489>.

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