

# MNR

# iNFOCUS

*Enriching the innerself*

January 2022

MNR's IN-HOUSE MAGAZINE

Happy  
Republic  
Day



# Events @ MNR Higher Education and Research Academy (MNR-HERA) Campus, Sangareddy, Telangana.

## STUDENTS ACHIEVEMENTS, MNR DENTAL COLLEGE & HOSPITAL



**Dr. MOHAMMED MUSHAHED ALI**  
MDS IIYR  
DEPARTMENT OF PROSTHODONTICS & IMPLANTOLOGY Won best paper presentation award in the 49th Indian Prosthodontic Society.



**Dr. Y. AKHILA REDDY**  
MDS IIYR  
DEPARTMENT OF PROSTHODONTICS & IMPLANTOLOGY Won best paper presentation award in the 49th Indian Prosthodontic Society.



**Dr. P. HARSHITHA**  
MDS II YR  
DEPARTMENT OF ORAL MEDICINE AND RADIOLOGY Won best paper presentation award in the 32nd National IAOMR Conference-2021

## VIDYANIDHI SCIENTIFIC PROGRAM CONDUCTED BY MNR DENTAL COLLEGE AND HOSPITAL



Soft skills training conducted from 13-12-21 to 18-12-21 by Telangana Academy of Skills and Knowledge (TASK) in collaboration with MNR College of Pharmacy.

Organized a workshop on "StartUp Opportunities in Healthcare" on 28-12-2021 Sachin Kumbhoje at with MNR College of Pharmacy.



# Editorial.....



**INFOCUS**  
**MNR's In-House**  
**Magazine**

**DECEMBER 2021**

## *Dream Big Dreams*

**“Dream lofty dreams, and as you dream,  
so you shall become. Your vision is the  
promise of what you shall one day be.”**

**-JAMES ALLEN**

Dreaming is to desire for something very new and essential for your life.

All our dreams can come true if we have the courage to pursue them. The more you can dream, the more you can do.

The ability to dream, to see the future before it is, is one of the characteristics of humans. No other species, to our knowledge, has this ability. Dreams are essential for the progress of the human race. Without someone dreaming, no progress is possible. Why? Because everything starts as a thought - a dream!

Dreams are critical to our success. Without a vision of the future, there is no motivation to act, no incentive to try, no reason to grow.

Every child is born blessed with a vivid imagination. But just as a muscle grows flabby with disuse, so the bright imagination of a child pales in later years if he ceases to exercise it.

Dreaming big means having the mental freedom to think about what you really want out of life and forget about all the reasons why you can't make it a reality.

The future belongs to those who believe in the beauty of their dreams..



**Editor**

Publisher  
&

Editor-in-Chief  
**Sri M.N. Raju**

Editor  
**K.Padma**

Illustrations and Designing

**Nagarjuna Ambati**  
**K Kishore Kumar**

Supporting Team

**P. Sharmila**  
**K Satyanarayana**

Postal Address :

**INFOCUS,**  
MNR's In-House Magazine

**MNR Research**  
**Conventions Pvt. Ltd.**

2-23B/350, Bhagyanagar-  
Phase III, HMT Hills Colony,  
Opp. JNTU Kukatpally,  
Hyderabad - 500 085.  
Ph : 040-23890835

Email :  
infocus@mnrrc.com

Facebook :  
www.facebook.com/  
infocusinhouse



**To be so strong that nothing can disturb my peace of mind.  
To talk health, happiness, and prosperity to every person I meet.  
To make all my friends feel that there is something worthwhile in them.  
To look at the sunny side of everything and make my optimism come true.  
To think only of the best, to work only for the best.  
And to expect only the best.  
To be just as enthusiastic about the success of  
Others as I am about my own to forget the mistakes of the past and press on to the  
Greater achievements of the future.  
To wear a cheerful at all times and give a smile  
To every living creature I meet.  
To give so much time to improving myself that I  
Have no time to criticize others.  
To be too large for worry, to noble for anger, too strong for fear.  
And too happy to permit the presence of trouble.  
To think well of myself and to proclaim this fact to the world.  
Not in loud words, but in great deeds.  
To live in the faith that the whole world is on my side,  
So long as I am true to the best that is in me.**

**-CHRISTIAN D. LARSON**

# YOU ARE YOUR MIND - L

**B**elief' is the route for thinking process. Generally you say "I believe I can achieve it, I can do it, I reach my target, I can get that change etc." All our thinking process starts with a belief of achieving. Without a belief we don't start our thinking and without thinking we don't start our actions. Without action there is no achievement in the life. The entire process of achieving something starts with a belief. So 'belief' is like a seed. The small seed becomes a big tree, and sometimes a single seed becomes the whole forest and the whole forest becomes a 'host' of many wonders. Your belief, a small belief, a little spark of belief, may lead to be a big action as the small seed gives birth to a big tree and in turn the big tree gives birth to a mighty forest.

Belief is also like a drop of water. A drop of water starts its journey and turns to



**Sri M N. Raju**  
Chairman  
MNR Educational Trust

be a mighty river. The river, in its journey, has many stages. Its origin is small but its end is very big. Your belief is also like the smallest drop and its end effects are enormous. A small tinkle of belief leads to a large amount of action and result.

- a) The power of your sub-conscious belief is the power of your sub-conscious mind.
- b) The power of your sub-conscious mind is the power of your conscious mind.
- c) The power of your mind is the power of your life.

Belief → Subconscious → Mind  
→ Mind → Man

Belief, faith, trust and some other words are used for the same purpose.

Why do we believe something?

Usually man feels comfortable when he believes some thing or

some one or some unexperienced expectation. He believes in a guru, in a God, in a religion, in a profession, in a place, in a way of life, in a type of food, in a style of dressing or even in a pet animal etc. He identifies himself to be in love, with a particular issue. That is belief or faith. One may believe blindly. One may believe after investigation. One may believe after research. One may believe some thing after inquiry or following others.

The Dark side of belief:-

Everything has two sides and 'Belief' is no exception. There is a dark side of belief too.

Belief too is open for making choices related to our lives. These beliefs could be related to our personal lives, health, wealth, career, family or business. A set of these beliefs lead to our destiny. These beliefs, that have brought us where we are today, will decide where we will be tomorrow. When you have these beliefs, some of them are driven by greed, which may cause harm to you and affect others also.

The other side of your belief may be brighter side, if you use them for the benefit of yourself, your family, society and mankind as a whole.

Believe in yourself:-

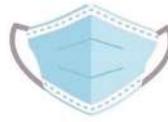
So avoid blind belief and to avoid blind belief, the best way is to believe in yourself. When you believe in yourself, you realize your inner strength. That inner strength makes you understand whether your 'belief' is 'wrong' or 'right'.

- Your belief in yourself becomes your life.
- You are the artist creating your life.
- Your search is also your goal.
- You are identified through your belief for achieving your goal.
- Your work is always to find your 'chosen work'.
- Act on what you believe is right.
- If you believe in yourself the rest will take care of itself.
- If you believe in yourself, you will find something to give to the world.

- If you believe in yourself you will understand that God doesn't need 'Your coconut' or your 'Clean shaved head', but he needs your contribution to His creation.
- Don't believe in many ways but in selected ones, which lead you towards your 'goal'.
- Try to live the life you create.
- If you feel that your belief has been leading into a wrong path, analyse carefully and set it right.
- **You believe:-**  
My work is the way.  
My love is the way.  
My present is the way.  
My past is the guiding way.  
I am the way.
- If you believe in others, you are a piece of dead wood floating in a river waters, which goes directionless.
- If you believe in yourself, you are a boat with a rudder and sails.
- You are a flute in the hands of the Creator, if you have belief in you. If not, you are a simple bamboo piece in the forest.

- Others believe you, if you have belief in yourself. Others belief is nothing unless you believe in yourself.
- You are alone; no one can help you, no one can support you in creating your own belief. It is your own invention, your own fantasy, your own dream, your own passion and it is always to be re-invented.
- So,  
Believe in yourself.  
Believe in your passion.  
Believe in your work.  
Believe in your achievement.  
Believe that you are a gift.  
Believe in being a gift to others.  
Believe that your life has a purpose.  
Believe in your invention.  
Believe that God has belief in you.  
Believe in yourself even when no one believes you.





**MRS. B. UVARANI**  
(Professor)

MNR COLLEGE OF NURSING, SANGAREDDY

# **MASKS FOR CHILDREN : USAGE, GUIDELINES, DOS & DON'TS, AND CHOOSING THE BEST ONE**

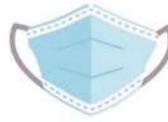
**W**e are seeing many more people wearing masks in public. While it definitely feels good to shake off the uneasy feeling associated with staying indoors, this doesn't mean that everyone is now completely safe from getting affected by the coronavirus. Social distancing guidelines for interacting with others have remained the same: adults and children must wear masks, stay six feet or more apart, wash their hands thoroughly, and avoid prolonged interactions indoors or in crowds.

That being said, wearing masks can be unsettling for kids, who have questions about them. Here are some common questions and answers that can help you respond to your child and calm his worries.

## **Why Is It Important for Children to Wear Masks Right Now?**

COVID-19 can spread in many ways, especially when people come in close contact with each other. Many individuals who are COVID-positive may not show symptoms, making it possible for them to spread the virus without knowing it.

Wearing a mask prevents those who have symptoms like a cough and those who are



asymptomatic, from spreading the virus to others when they express viral droplets from their mouth or nose through actions like sneezing, coughing, or speaking. Masks can also help one keep their hands away from their face so that they are less likely to infect themselves after touching a contaminated person or surface.

### **How to Explain the Importance of Wearing a Mask to Your Child**

First and foremost, you'll need to make sure your child understands the complexity of the pandemic so that he takes guidelines seriously, such as staying apart from one another and wearing masks. Older kids can understand more things cognitively and usually need more explanation, while very young kids may need less information.

Be very honest (but do not scare your child) about how a mask helps prevent anyone from spreading germs. Explain that coughing and sneezing can sometimes spread harmful germs, and wearing a mask creates a protective barrier. Reward your child whenever you can for wearing a mask. Check in often and let your child know that these health behaviours are difficult and can be uncomfortable and that he should not hesitate to report any mishaps.

### **What is the Right Way to Wear a Mask?**

Place the mask securely over your child's nose and mouth, and stretch it from one ear to the other. It should fit perfectly along the sides of the face, and not have any gaps. It can be secured with ties or ear loops. Encourage your child to wash his hands before and after wearing the mask, and to avoid touching it once it's on. When he's back home from the outdoors, he should avoid touching the front of the face mask and instead remove it by taking it off his ears.

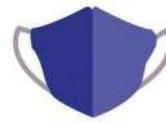
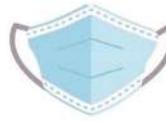
Place the mask securely over your child's nose and mouth, and stretch it from one ear to the other. It should fit perfectly along the sides of the face, and not have any gaps. It can be secured with ties or ear loops. Encourage your child to wash his hands before and after wearing the mask, and to avoid touching it once it's on. When he's back home from the outdoors, he should avoid touching the front of the face mask and instead remove it by taking it off his ears.

### **When Should Children Wear a Mask?**

Children over two years of age should wear a mask, especially:

- If they are experiencing coronavirus symptoms like coughing, fever, and other symptoms that are present in those with the virus.
- When they are in places where they can come in contact with surfaces where the virus could have been present, and are not able to keep their hands off the surfaces.
- When they are in places where it's impossible to maintain social distancing.
- When otherwise required by law.





## When Should a Child Not Wear a Mask?

New guidelines for managing COVID-19 infection in children state that children aged two years and below shouldn't wear masks. This is because the risk of infection is less, and there are also concerns that the masks may pose safety issues. Children should also avoid wearing masks if they have any difficulty breathing or are unable to remove the mask without assistance.

## What If the Child Can't Wear a Mask?

Some children find it difficult to wear face masks because they have sensory issues, are hard of hearing, interact with a deaf person, etc. In these cases, the Centers for Disease Control and Prevention (CDC) recommends wearing plastic face shields that envelop the sides of the wearer's face and extend below the chin. You can also opt for hooded face shields that provide more protection against COVID-19. Caution should be taken while wearing a face shield to prevent injuries that could break the shield and harm the eyes or face.

## Tips for Choosing the Best Face Mask for Your Child

When selecting a mask, there are many options available. Here are some important dos and don'ts to keep in mind.

## DO choose masks that

1. Completely cover the nose and mouth.
2. Have a minimum of two layers of washable, breathable fabric.
3. Have a nose wire to prevent air from escaping out of the top of the mask.
4. Fit comfortably against the sides of the face and don't have gaps.

## DON'T choose masks that

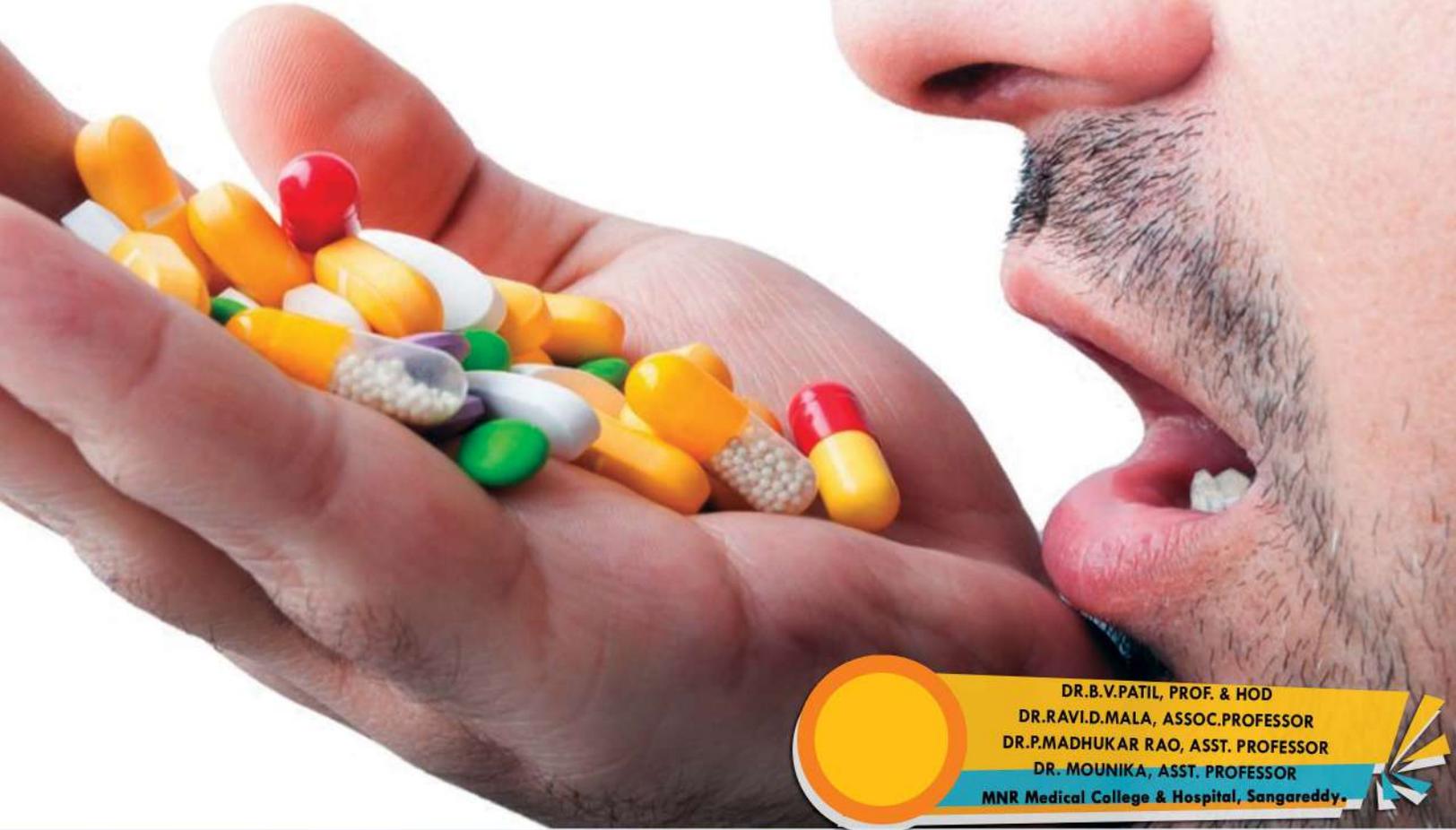
1. Have exhalation vents or valves that allow virus particles to escape.
2. Are made of fabric that makes it difficult to breathe, like vinyl.
3. Are prioritised for healthcare workers, including N95 respirators.

Face masks can be part of physical distancing practices when required or recommended by health authorities. They act as a physical barrier to the spread of COVID-19 when one breathes, talks, coughs, or sneezes. You may be wondering whether your little one should be wearing a face mask in addition to taking other measures. In that case, it's important to consider his age and developmental stage, medical history, and his ability to put on, wear, and remove the face mask safely and correctly.



**WEAR A FACE MASK  
TO PROTECT EACH OTHER**





DR. B. V. PATIL, PROF. & HOD  
DR. RAVI. D. MALA, ASSOC. PROFESSOR  
DR. P. MADHUKAR RAO, ASST. PROFESSOR  
DR. MOUNIKA, ASST. PROFESSOR  
MNR Medical College & Hospital, Sangareddy.

## Drug Abuse & Addiction of Prescribed drugs

**M**isuse of drugs that are prescribed, is common among young adults accounting to 14.4% between 18 to 25 years of age, in the recent years.<sup>1</sup> In India opioids are commonly used by Injection Drug Users (IDUs). These opioids include heroin ('smack' / 'brown sugar') as well as pharmaceutical opioids (such as buprenorphine, pentazocine and dextro-propoxyphene). In the north-eastern region, heroin and dextropropoxyphene are the most commonly used opioids; impure heroin (smack), and buprenorphine are the most commonly used opioids in metropolitan cities such as Delhi, Mumbai, Chennai and Kolkata. Pentazocine is the most commonly injected opioid in Karnataka, Andhra Pradesh, Chattisgarh. In the states of Punjab and Haryana, buprenorphine is commonly used by injectors.<sup>9</sup>

Drug abuse is use of a drug by self medication in a manner and dose that deviates from the approved medical and social patterns in a given culture and time. Addiction is defined as a chronic, relapsing disorder characterized by compulsive drug seeking and use despite adverse consequences.<sup>2</sup> Addiction has evolved as serious illness like heart disease which disrupt the normal, healthy functioning of an organ in the body, leading to harmful effects sometimes leading to death that are preventable and treatable. There are numerous factors that can influence on prescription drug misuse including age, gender, and other factors, and more importantly ease of its access.<sup>3</sup> The prescribed drugs that are commonly misused are categorized into three classes which includes Opioids, CNS stimulants



and CNS depressants including sedatives, hypnotics and tranquilizers. Among opioids, morphine, codeine and diphenoxylate that are used for pain relieving properties are the candidates for misuse. <sup>4</sup> The CNS stimulants dextroamphetamine and methylphenidate used for cognition enhancement are highly addiction prone. <sup>6</sup> The CNS depressants like benzodiazepines, non benzodiazepines and barbiturates used for treating anxiety, seizures and sleep disorders are also potentially addictive. <sup>5</sup>

Apart from the addiction liability of the above drugs their misuse can lead to deleterious health effects including death. Hence, the physicians, pharmacists and their patients can play a major role in identification and prevention of prescription drug abuse. Specifically, by the establishment of Prescription drug monitoring programs (PDMPs), from the state-run electronic databases, which is done in USA can track the prescription and dispensation of controlled prescription drugs can prevent the misuse of prescribed drugs. Moreover, the major importance in the prevention of prescribed drug misuse lies in the hands of patient and can be achieved by following proper instructions of drug usage that is either printed on the label or by adhering to

physician/pharmacist instructions at the time of drug dispensation. Patient also should be made aware of the deleterious health effects, and its potential interactions with other drugs as well as alcohol. Recently some efforts have been taken to decrease the misuse of opioids which are prescribed but has resulted in an increase use of Heroin often with fentanyl and its potent derivative such as carfentanil. The reversal of fentanyl and its derivatives is much more difficult than reversal of opioids such as morphine. This has contributed to a dramatic increase in death rates with over 33,000 due to overdose in USA. In India cough syrup, especially with codeine is commonly misused. The treatment of the affected patients fall into two categories either by behavioral therapy and medications. The behavioral therapy including contingency management and cognitive-behavioral based therapies helps in changing the patient's unhealthy patterns of thinking and behavior, and also helps in managing cravings and avoids cues and situations that lead to relapse. Additionally behavioral therapy involving individual, family, or group counseling also can help patients to improve their personal relationships and their ability to function at work and in the community.<sup>7</sup> The medical treatment of the prescription drug abuse is treated by antidotes especially for

opioid abuse. The Opioid antidotes commonly used are buprenorphine, methadone, and naltrexone/naloxone. Medical treatment for opioid addiction are often administered along with psychosocial supports or behavioral treatments, such as medication-assisted treatment (MAT) to get the maximum benefit.<sup>8</sup>

### References:

1. Miech R, Schulenberg J, Johnston L, Bachman J, O'Malley P, Patrick M. Monitoring the Future National Adolescent Drug Trends in 2017: Findings Released. Ann Arbor, MI: Institute for Social Research, The University of Michigan; 2017. <http://www.monitoringthefuture.org//pressreleases/17drugpr.pdf>. Accessed January 2, 2018.
2. Webster PC. Oxycodone class action lawsuit filed. CMAJ Can Med Assoc J. 2012;184(7):E345- E346. doi:10.1503/cmaj.109-4158
3. Manchikanti L, Fellows B, Ailinani H, Pampati V. Therapeutic use, abuse, and nonmedical use of opioids: a ten-year perspective. Pain Physician. 2010;13(5):401-435.
4. Dowell D, Haegerich TM, Chou R. CDC Guideline for Prescribing Opioids for Chronic Pain—United States, 2016.; 2016. <https://www.cdc.gov/mmwr/volumes/65/rr/rr6501e1.htm>. Accessed September 18, 2018.
5. Gunja N. The clinical and forensic toxicology of Z-drugs. J Med Toxicol Off J Am Coll Med Toxicol. 2013;9(2):155-162. doi:10.1007/s13181-013-0292-0
6. Santosh PJ, Sattar S, Canagaratnam M. Efficacy and tolerability of pharmacotherapies for attention-deficit hyperactivity disorder in adults. CNS Drugs. 2011;25(9):737-763. doi:10.2165/11593070-000000000-00000
7. Volkow ND, Frieden TR, Hyde PS, Cha SS. Medication-assisted therapies—tackling the opioid- overdose epidemic. N Engl J Med. 2014;370(22):2063-2066. doi:10.1056/NEJMp1402780
8. Center for Behavioral Health Statistics and Quality. Treatment Episode Data Set (TEDS) 2002-2012: National Admissions to Substance Abuse Treatment Services. Rockville, MD: Substance Abuse and Mental Health Services Administration; 2014. [http://www.samhsa.gov/data/sites/default/files/TEDS2012N\\_Web.pdf](http://www.samhsa.gov/data/sites/default/files/TEDS2012N_Web.pdf).
9. <https://www.nhp.gov.in/disease/non-communicable-disease/substance-abuse>

Acknowledgement : We express our sincere thanks to Dr.Venkat Ramanaiah, Principal and Dr.Chandrakumar Shanmugam, Professor of Pathology, MNR Medical College & Hospital ,Sangareddy for critically reviewing this article for i-mantra.



# DIABETES AND GUM DISEASE



Oral health has a direct and or indirect impact on the overall general health. periodontitis is an infectious inflammatory disease caused by the bacteria of the dental plaque, resulting in the progressive destruction of the supporting tissues of the teeth, i.e., the gingival, the periodontal ligament, cementum, and the alveolar bone. Individual susceptibility of periodontitis is influenced by a number of factors including systemic diseases and conditions. Many systemic conditions like cardiovascular conditions, pregnancy, stress is considered as risk factors and diabetes is one amongst them

The increased prevalence and severity of periodontitis is typically seen in patients with diabetes led to designation of periodontitis as the sixth complication of diabetes by American academy of periodontology.

## WHAT IS DIABETES?

Diabetes is a metabolic disease that occurs when your blood glucose, also called blood sugar,

is too high (hyperglycaemia). Blood glucose is your main source of energy and comes from the

food you eat. Insulin, is the hormone produced by pancreas, helps glucose from food reach cells for energy.

In certain conditions our body doesn't produce enough insulin or doesn't use the produced insulin. Glucose then stays in your blood and doesn't reach the cells.

## WHAT ARE THE DIFFERENT TYPES OF DIABETES?

### 1. TYPE 1 DIABETES

The immune system attacks and destroys the cells that produce insulin within the pancreas  $\beta$  cells. Type 1 diabetes is usually diagnosed in children and young adults.

### 2. TYPE 2 DIABETES

In this diabetes the insulin produced is not taken up by the body cells or enough insulin is not produced. This type of diabetes occurs most often in middle-aged and older people.

### 3. GESTATIONAL DIABETES

Gestational diabetes develops in some women when they are pregnant. Most of the time, this type of diabetes disappears after the baby is born.

## SYMPTOMS OF DIABETES

- Increased hunger- polyphagia
- increased thirst- polydipsia
- frequent urination- Polyuria
- weight loss
- blurry vision
- extreme fatigue
- sores that don't heal



## COMPLICATIONS OF DIABETES

- Retinopathy
- Nephropathy
- Neuropathy
- Macrovascular diseases
- Altered wound healing
- Periodontitis



## WHY ARE PEOPLE WITH DIABETES MORE LIKELY TO DEVELOP ORAL HEALTH PROBLEMS?

- Diabetes is a major risk factor for periodontitis; susceptibility to periodontitis is increased by approximately threefold in people with diabetes.
- Diabetes leads to reduction in defence mechanism and increased susceptibility to infection leading to destructive periodontal disease.
- The increased susceptibility to infection and reduced healing capacity with altered collagen metabolism may explain the increased level of periodontal destruction.
- Increased glucose level in crevicular fluid in diabetics may favour the growth of some microbial species.



## PEOPLE WITH DIABETES SHOW THE FOLLOWING ORAL SYMPTOMS:

- Dry mouth: Decrease saliva flow causes dry mouth which further lead to soreness, ulcers, and tooth decay.
- Gum inflammation (gingivitis) and periodontitis: Since periodontal disease is a bacterial infection, people with uncontrolled diabetes might experience more frequent and more severe gum disease.
- Poor healing of oral tissues: In uncontrolled diabetes wounds do not heal quickly after oral surgery or other dental procedures.
- Thrush: diabetic people who frequently take antibiotics are especially prone to developing a fungal infection of the mouth and tongue. The fungus thrives on the high glucose levels in the saliva of people with uncontrolled diabetes.
- Burning mouth and/or tongue: This condition is caused by the presence of thrush



## MANAGEMENT:

- Use your diabetes-related medications as directed
- Eat healthy diet that include fruits, vegetables, whole grains
- Get at least 150 minutes per week of aerobic exercise, such as walking or cycling. • Cut saturated and trans fats, along with refined carbohydrates, out of your diet.

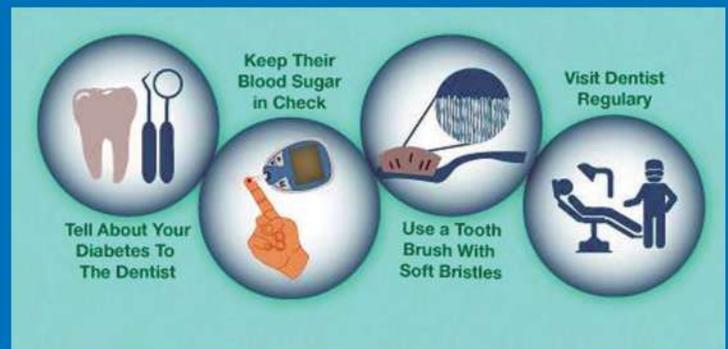


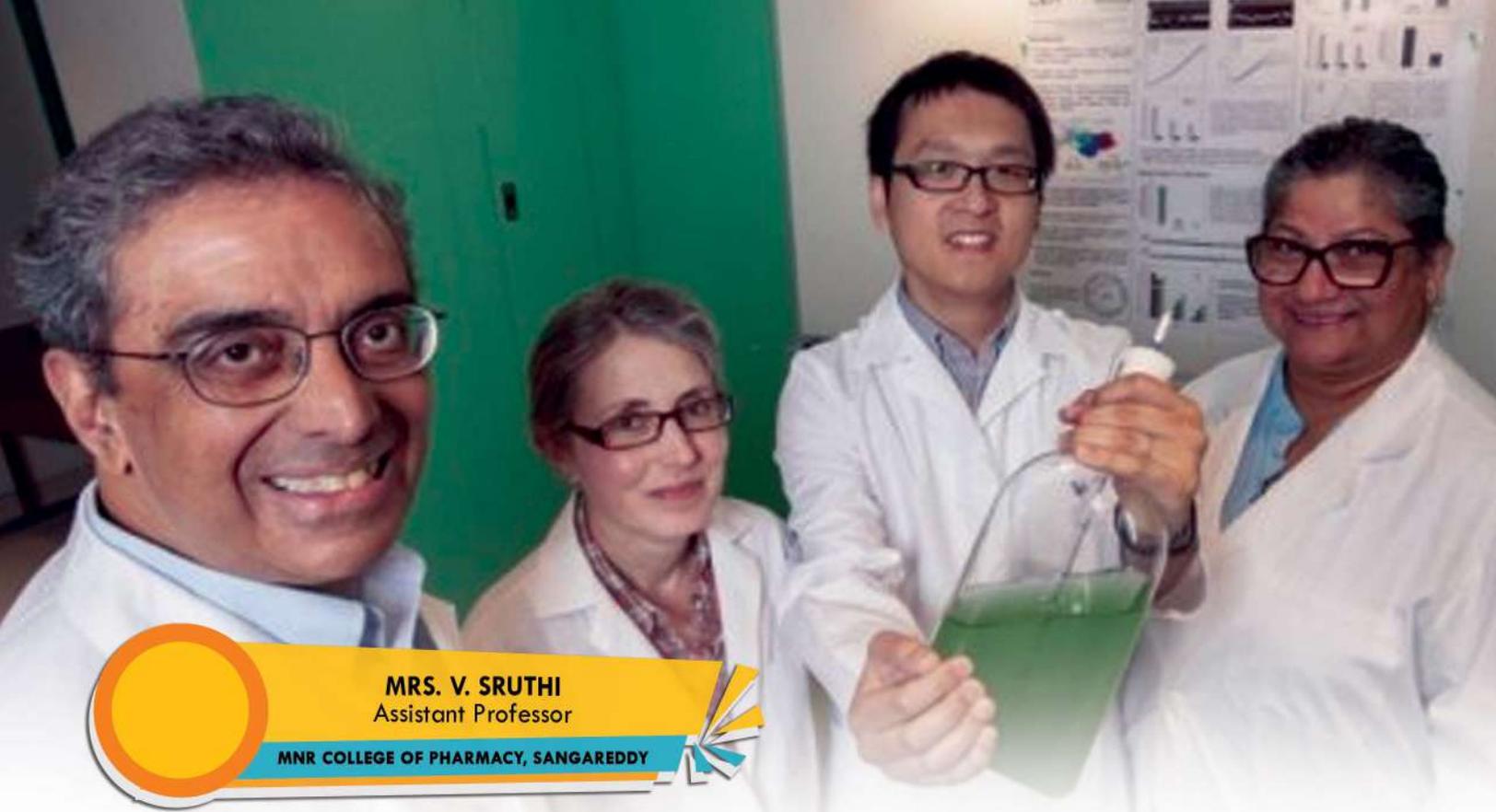
## DENTAL MANAGEMENT INCLUDES:

- Regular dental visits are important.
- Control your blood sugar levels.
- Research suggests that treating gum disease can help improve blood sugar control in patients living with diabetes, decreasing the progression of the disease.
- Practicing good oral hygiene. • Advising on the various types of oral care products and how to use them
- Advice on cessation of smoking or tobacco if any

Diabetes is a systemic disease which is a serious oral co-morbidity. there is a need for

appropriate health education as good oral health is important for diabetic individuals.





**MRS. V. SRUTHI**  
Assistant Professor  
MNR COLLEGE OF PHARMACY, SANGAREDDY

# BACTERIA ENGINEERED TO CREATE FERTILIZER OUT OF THIN AIR

Next step could be 'nitrogen-fixing' plants that can do the same, reducing the need for fertilizer

In the future, plants will be able to create their own fertilizer. Farmers will no longer need to buy and spread fertilizer for their crops, and increased food production will benefit billions of people around the world, who might otherwise go hungry.

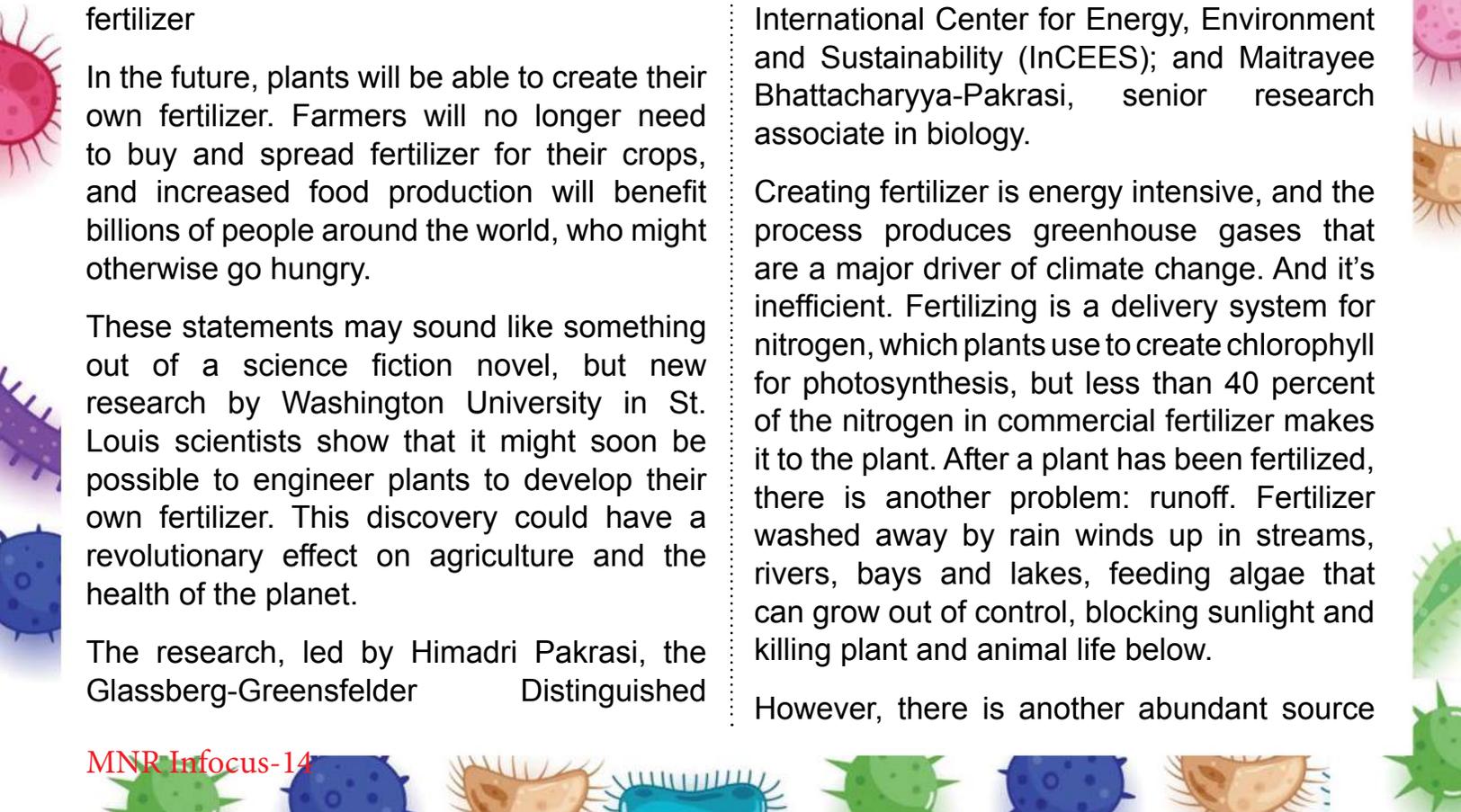
These statements may sound like something out of a science fiction novel, but new research by Washington University in St. Louis scientists show that it might soon be possible to engineer plants to develop their own fertilizer. This discovery could have a revolutionary effect on agriculture and the health of the planet.

The research, led by Himadri Pakrasi, the Glassberg-Greensfelder Distinguished

University Professor in the Department of Biology in Arts & Sciences and director of the International Center for Energy, Environment and Sustainability (InCEES); and Maitrayee Bhattacharyya-Pakrasi, senior research associate in biology.

Creating fertilizer is energy intensive, and the process produces greenhouse gases that are a major driver of climate change. And it's inefficient. Fertilizing is a delivery system for nitrogen, which plants use to create chlorophyll for photosynthesis, but less than 40 percent of the nitrogen in commercial fertilizer makes it to the plant. After a plant has been fertilized, there is another problem: runoff. Fertilizer washed away by rain winds up in streams, rivers, bays and lakes, feeding algae that can grow out of control, blocking sunlight and killing plant and animal life below.

However, there is another abundant source





of nitrogen all around us. The Earth's atmosphere is about 78 percent nitrogen, and the Pakrasi lab in the Department of Biology just engineered a bacterium that can make use of that atmospheric gas -- a process known as "fixing" nitrogen -- in a significant step toward engineering plants that can do the same.

The research was rooted in the fact that, although there are no plants that can fix nitrogen from the air, there is a subset of cyanobacteria (bacteria that photosynthesize like plants) that is able to do so. Cyanobacteria can do this even though oxygen, a byproduct of photosynthesis, interferes with the process of nitrogen fixation.

The bacterium used in this research, *Cyanothece*, is able to fix nitrogen because of something it has in common with people.

"Cyanobacteria are the only bacteria that have a circadian rhythm," Pakrasi said. Interestingly, *Cyanothece* photosynthesizes during the day, converting sunlight to the chemical energy they use as fuel, and fix nitrogen at night, after removing most of the oxygen created during photosynthesis through respiration. The research team wanted to take the genes from *Cyanothece*, responsible for this day-night mechanism, and put them into another type of cyanobacteria, *Synechocystis*, to coax this bug into fixing nitrogen from the air, too.

To find the right sequence of genes, the team looked for the telltale circadian rhythm. "We saw a contiguous set of 35 genes that were doing things only at night," Pakrasi said, "and they were basically silent during the day."

The team, which also included research associate Michelle Liberton, former research associate Jingjie Yu, and Deng Liu manually removed the oxygen from *Synechocystis* and added the genes from *Cyanothece*. Researchers found *Synechocystis* was able

to fix nitrogen at 2 percent of *Cyanothece*. Things got really interesting, however, when Liu, a postdoctoral researcher who has been the mainstay of the project, began to remove some of those genes; with just 24 of the *Cyanothece* genes, *Synechocystis* was able to fix nitrogen at a rate of more than 30 percent of *Cyanothece*.

Nitrogen fixation rates dropped markedly with the addition of a little oxygen (up to 1 percent), but rose again with the addition of a different group of genes from *Cyanothece*, although it did not reach rates as high as without the presence of oxygen.

"This means that the engineering plan is feasible," Pakrasi said.

The next steps for the team are to dig deeper into the details of the process, perhaps narrow down even further the subset of genes necessary for nitrogen fixation, and collaborate with other plant scientists to apply the lessons learned from this study to the next level: nitrogen-fixing plants.

Crops that can make use of nitrogen from the air will be most effective for subsistence farmers -- about 800 million people worldwide, according to the World Bank -- raising yields on a scale that is beneficial to a family or a town and freeing up time that was once spent manually spreading fertilizer.

"If it's a success," Bhattacharyya-Pakrasi said, "it will be a significant change in agriculture."

#### Reference:

Deng Liu, Michelle Liberton, Jingjie Yu, Himadri B. Pakrasi, Maitrayee Bhattacharyya-Pakrasi. Engineering Nitrogen Fixation Activity in an Oxygenic Phototroph. *mBio*, 2018; 9 (3): e01029-18

# Activities @ MNR Golden Kids (Navi Mumbai)



# Activities @ MNR Golden Kids (Hyderabad)



# Activities @ MNR Group of Schools



Bhel, Hyderabad



Chintal, Hyderabad



Sangareddy, Hyderabad



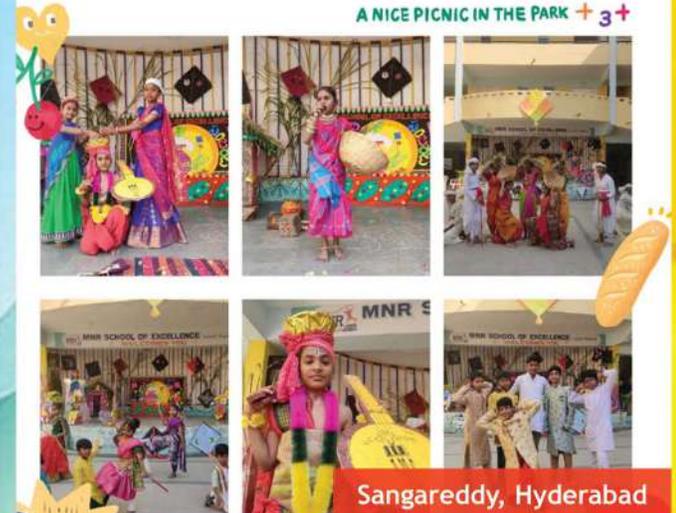
MNR International School



Kite Making Competition



Mehdipatnam, Hyderabad



Sangareddy, Hyderabad

# Activities @ MNR Group of Schools



Kukatpally, Hyderabad



Chintal, Hyderabad



Bhel, Hyderabad



Bhel, Hyderabad



Navi Mumbai



Rangoli Competition  
Mehdipatnam, Hyderabad

# MANTHENA AMERICAN SCHOOL DUBAI, SHARJAH

**Manthena American School**, located in **Sharjah UAE** opened its doors this past October. A school designed for innovation, the American curriculum delivers learning through STEAM (science, technology, engineering, arts and mathematics) to support students' application of concept learned. Additionally, the school has adopted the Project Based Learning (PBL) method of the curriculum implementation. In the core subjects of English, mathematics and science, students are learning the same topic to reinforce academic vocabulary use, transferring of skills across academic subjects and application of the learned skills by submitting an end of term project focused on the unit theme and solving a global issue around sustainability.

An example was the fourth-grade unit for Term I named "Finding Solutions Together". The unit focused on the UAE's efforts towards solar energy as a priority initiative. Students learned about solar energy in all subjects, researching global efforts on solar energy and its uses. The culminating project at the end of term was that students had to build a functional solar oven and cook food of their choice.

All students presented their projects and findings during our inaugural Learning Expo. At the Learning Expo, each student, grades 1-5 presented to an audience of teachers, parents and their peers. Students excelled and demonstrated exceptional leadership skills, passion and knowledge of their subject and pride about their individual projects.

**Manthena American School** Sharjah is pleased to pursue the excellence of the other MNR institutions.



Our Motto

# EDUCATION *And* HEALTH



Well organized  
**BUS FACILITY**  
with regular  
**SANITIZATION**

Your  
child  
is in  
safe  
hands



- ◆ Sanitized school premises.
- ◆ **Spacious and well ventilated class rooms.**
- ◆ **Seating arrangements redesigned according to social distancing norms.**
- ◆ **Hygienic toilets.**
- ◆ Trained helpers to sanitize students at the entrance.
- ◆ Thermal screening everyday.
- ◆ **Hand sanitizer Provided**
- ◆ **Face Masks Mandatory for all.**
- ◆ Rescheduled time-table according to government guidelines.
- ◆ Well trained teachers and staff to deal with the pandemic.
- ◆ Awareness programmes for parents and students
- ◆ Frequent sanitization of common areas

# MNR GROUP OF SCHOOLS

HYDERABAD | MUMBAI | SHARJAH  
(Dubai)

E-mail : [info@mnrindia.org](mailto:info@mnrindia.org) Website : [www.mnrindia.org](http://www.mnrindia.org)