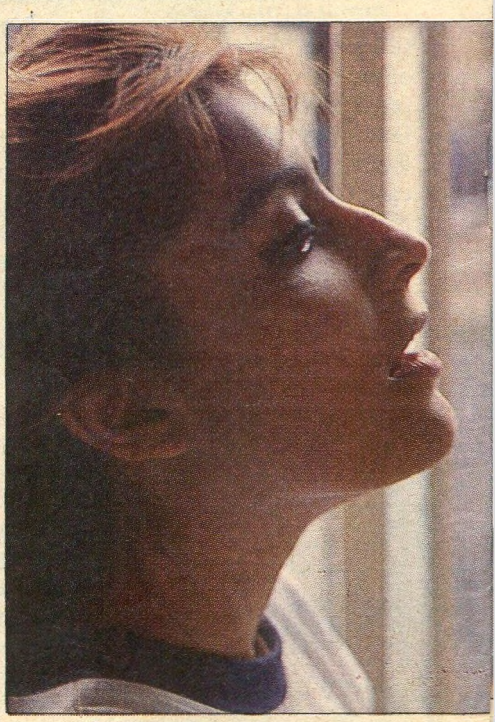
Who's winni

Dr Tilak Kumar, GP

"It is unfair to blame the GP alone for increasing antibiotic resistance. Patients should be educated against self-medication"

With the increasing use — and abuse — of antibiotics, bacteria are learning to fight back against the deadly drugs



You have the sniffles, you are running a temperature and your headache won't let you think. Your doctor sympathises with your desire to be back to normal for tomorrow's crucial event and prescribes an antibiotic. You wince at the price, but the next day, there is good news because you are already feeling fine. Good doctor, you think indulgently and spread the word to your friends.

Now for the bad news: the antibiotic could *not* have made you better. An antibiotic takes more than a day to even begin to effectively cure you — at least for most common infections.

Perhaps you didn't need the antibiotic anyway as you probably had a viral infection. And though doctors never bother to explain this to patients, antibiotics have no effect on viruses.

The truth is that antibiotics are among the most used and most abused of drugs today. By some estimates, more than ten per cent of all drugs prescribed in India are antibiotics. And because they are expensive, they account for almost half the value of all drugs sold in the market.

So what, you shrug, perhaps I took the wrong medicine. But I got better, didn't I?

Maybe you did. But maybe you also

Did you know? *Some little-known facts about antibiotics*

The beginning

Mass production of the first antibiotics began during World War II, when penicillin was found to have reduced a great number of amputations and casualties.

Then, since it was relatively cheap the use of antibiotics spread like wildfire.

Oh, what a lovely war!: the beginning of penicillin

And now...

Take a look at these figures. Incredible as it may sound, today, the Indian drug market has 70,000 formulations available to doctors and patients — even though the World Health Organisation lists only 250 essential drugs.

With so many antibiotics in the market today with so many

ng this war?

ASHOKE CHAKRABARTY

helped create more antibiotic resistant germs (pathogens) within your body. That could mean that someday, when your body *really* needs an antibiotic drug to fight a serious illness, the drug won't have the desired effect.

Antibiotic resistance

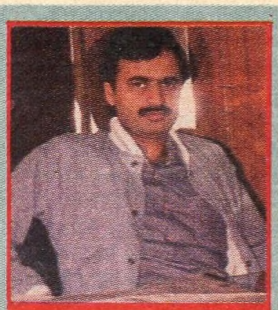
The more you take, the less it works

It goes back a little to the days when Alexander Fleming discovered penicillin, which led finally to the use of the first antibiotics in the Forties. Mass production of the first antibiotics, penicillin and streptomycin, began during World War II. Penicillin opened the flood gates to a variety of antibiotics that worked very effectively against disease-causing bacteria.

Since it was relatively cheap and easy to administer, and since they worked miraculously on the then life-threatening diseases like tuberculosis, typhoid and venereal disease, the use of antibiotics spread like wild fire.

Even today, newer antibacterials (for the purposes of this article, antibacterials and antibiotics are being used synonymously in terms of their action, i.e. inhibiting bacteria) are being created regularly by drug designers with a little tinkering of the organic chains of older drugs, or with other chemical jugglery. The potential for new drugs seems limitless.

Except for one thing. Even five decades after the first antibiotics were introduced, bacterial diseases remain a major cause of illness, and even death.



Ram Shah, pharmacist

> "Bacteria evolve much faster than human beings. The only way out against them is to keep one step ahead through technical innovation"

SUDIP ACHARYA

On the market: more than we need

variations, this leads to the dangerous abuse of drugs by an unsuspecting public.

Suffer the little ones

The overuse of antibiotics is particularly shocking when it is extended to children, who can develop resistant strains of bacteria in their systems which they pass on to other children. These children can then develop diseases for which commonly prescribed antibiotics provide no cure.

VIVEK DAS

The vulnerable ones: not all pediatricians care

Good news for the manufacturer

The economic problem has not stopped pharmaceutical companies from pumping a lot of money into the antibiotics research market.

Cynics would say it is with good reason. The

Although this has something to do with poverty and the lack of medical care, it also has a lot to do with the problem of *resistance*.

As bacteria are bombarded with the antimicrobials (another term covering antibiotics) designed to kill them, they do their best to fight back, to develop armour against the deadly drug. And they use formidable and cunning methods to do so. The bacteria, microscopic as they are, are diabolically clever. Their very simplicity allows them to evolve easily to win the war against the enemy.

Among the many methods used by micro-organisms to develop resistance to a drug is genetic mutation. The gene in the bacteria which is supposed to be sensitive to the antimicrobial factor mutates and the antibiotic proves useless in attacking the micro-organism.

Worse (for us, not for the bacteria), they can transmit the acquired resistance, called the R-factor, to other bacteria. And worst of all, there is then a selective multiplication of antibiotic-resistant strains. These are the supergerms, which can laugh into the face of the doctor's prescription and continue to wreak havoc in your body, in defiance of many of the multi-coloured tablets in the market.

When in doubt, prescribe

Indian doctors love antibiotics

Resistance to antibiotics develops mainly because of their inappropriate and irrational use. Survey after survey reveals that antibiotics are being widely misused, especially in India, where drug laws even if stringent, are rarely implemented.

One survey conducted by the Christian Medical College and Hospital at Vellore found that in common infections like fevers of short durations, antibiotics are not indicated in 78 per cent of the cases in which they are prescribed.

What do these specialists mean when they say that your trusted family doctor is responsible for widespread resistance to antibiotics?

General practioners can prescribe antibiotics for relatively minor ailments or by prescribing them when they are not required at all. Such shotgun therapy leads to an overusage of antibiotics, which then makes bacteria more quickly resistant. Doctors sometimes also prescribe the wrong doses.

If a patient is underdosed, some bacteria in the body could remain active or through some method of mutation could actively thrive. Equally, overdoses have their own problems: they make the bacteria more aggressive.

All doctors are well-acquinted with these facts. So why is there so much abuse of antibiotics?

Well, there are many reasons. One, doctors have a mandate to give the patient relief. And they cannot wait for the sensitivity tests (which tell you which antibiotic will work on your infection) to start medicating a patient because that will push recovery further away.

What is the impact of these malpractices on the community as a whole? The frightening truth, as a handbook on antibiotics says, "One clinician's bad prescribing can directly affect patients of colleagues via selection of the cross-infection by antibiotic-resistant micro-organisms. Furthermore, the profligate use of antimicrobials in one locality may result in resistant organisms with the potential to spread widely and rapidly."

To all of us it means that if your friends Sheela and Ramesh take their children regularly to a physician who often and wrongly prescribe antibiotics for every small ailment like upper respiratory viral infection or fever, then the bacteria in the kids' bodies may become resistant to the drug. And when you meet

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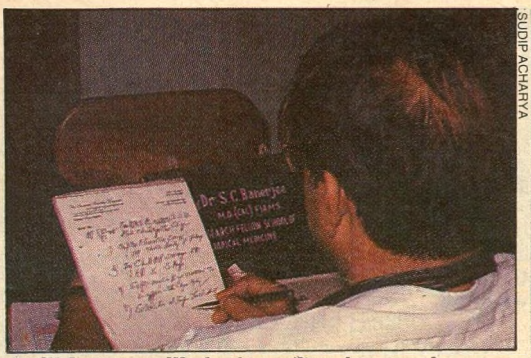
those cherubic kids at the next neighbourhood party, it is just possible that your kids could bring home the antibiotic-resistant infection. And you, model parent as you are, with little or no antibiotic exposure for your kids, will still find that the commonly prescribed antibiotic does little to cure your children quickly. Individual abuse leads directly to collective resistance.

Did you know? ◆ *Some little-known facts about*

spiralling prices of newer drugs that are entering the market each day also mean better bottom lines for the drug industry.

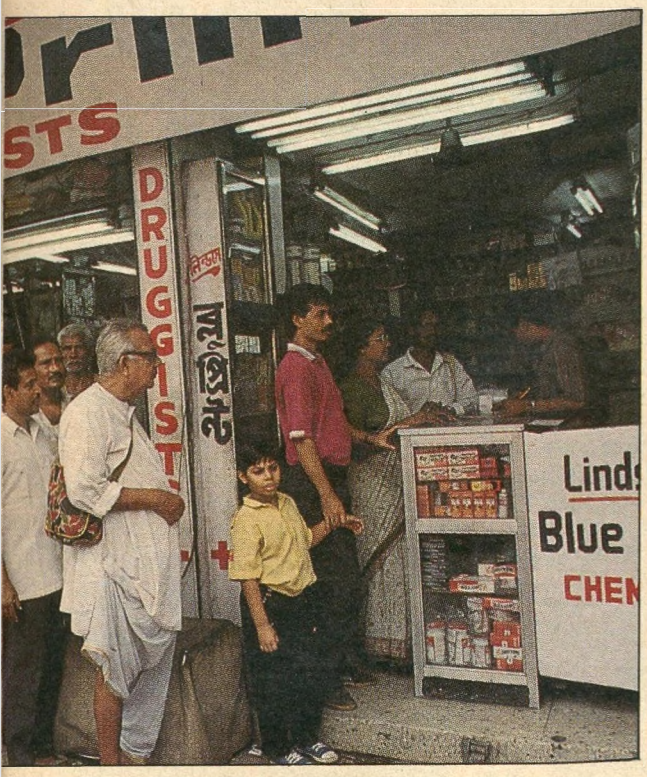
The doctor isn't God

Don't be afraid to question your doctor when he prescribes antibiotics. They will not cure you if, for instance, you have a viral infection. Ideally, antibiotics should only be given after a culture/sensitivity test determines what will be effective.



SUDIP ACHARYA

A pill for every ill: doctors dare too much



There is no need for any knee-jerk reaction to antibiotics either. Modern societies could not survive without antibiotics, which are marvellous agents of recovery

But in fact, it is often patients themselves who are responsible for misusing antibiotics. Two days into an antibiotic course, when one of the milder side effects of the antibiotics are becoming bothersome (perhaps gastro-intestinal problems) and you are otherwise recovered, you may be tempted to stop the medicine. That's when you are tempting fate. Because you have allowed some active bacteria to remain within your body. And the bacteria need just that oppurtunity to develop mechanisms to resist the drug next time around.

Sometimes, however, it is also the economic factor which precents a patient from completing his antibiotic course. "Often, my patients, especially the poorer mothers, say they gave their children only as many tablets as they could afford, or as many as their husband bought," says Dr Nalini Shenoy, a pediatrician in Bangalore.

Given this patent misuse among the general public, Dr Tilak Kumar, a family physician, thinks it is unfair to blame the GP alone for increasing antibiotic resistance. "If we abolish quackery, where allied medicine doctors wrongly prescribe antibiotics, if we get druggists to dispense antibiotics strictly against prescriptions only, and if we educate patients against self-medication or incomplete medication, there will definitely be less of a problem," he says.

Even if there was no misuse on the part of doctor or patient, however, bacteria would still someday beat the drugs meant to destroy them. Says Ram Shah, proprietor, Tilrode Chem, with a PH.D in pharmacy from Belgium, "It is a purely evolutionary process. Bacteria evolve so much faster than human beings. Some bacteria could have a life span of half a day. So the evolution time scale is much smaller. In a matter of time, a strain of bacteria would develop natural resistance to a drug."

So how do mere human beings win the war against deadly bacteria? Ram Shah displays the same insouciance shared by many others in the pharmaceutical industry. He keeps faith in the endless innovation of medical technology. "The only way out is to keep one step ahead through technical innovation," he says.

One of the ways of tackling resistance, for instance, is to develop missiles that penetrate the shields that bacteria develop around them.

This brings up the question: Is it infinitely possible to create new antimicrobials? Can we have newer and newer generations of cephalosporins etc.?

Technically, the answer is yes. "We would hate to think that there could be a limitation," says K.S. Chandraprakash, senior product manager at the Bangalore Pharmaceutical and Research Laboratory (P) Ltd (BPRL).

Even so, it still begs the next question. At what cost? And there's the rub. "The future is limitless so long as money is limitless," explains Ram Shah. "With faster obsolescence of drugs, more and more money has to be pumped in all the time (to create newer generation antibacterials) and then you get into an economic problem." So far, the economic problem has not stopped pharmaceutical companies from pumping a lot of money into the antibiotics research market.

Cynics would say it is with good rea-

antibiotics

At the Bangalore Laboratory: the search goes on

Once you are convinced of the need to take an antibiotic, inform yourself about the correct dosage and duration of the medication — *and keep to them.*

Never self-medicate, re-use old prescriptions or old antibiotics lying around the house. It may tempt you to take non-optimal doses.

Remember that prevention is better than cure. Antibiotics are no substitute for good sanitation and personal hygiene.

son. The spiralling prices of newer drugs that are entering the market each day also mean better bottom lines for the drug industry. And the obsolesence of older, cheaper antibiotics is only good news for pharmaceutical companies. As doctors prefer to, or are forced to use higher order antibiotics to kill simple ailments, the bills that go up are the patients'.

Take a look at these figures. The Indian drug market has 70,000 formulations available to doctors and patients when WHO lists only 250 essential drugs and even the Hathi committee which went into the issue found only 116 drugs essential for India. The mind-boggling figure of 70,000 preparations includes many unessential and sometimes dangerous drugs that are in fact banned in many other countries.

antibiotics. Millions of dollars are spent to research, produce and market each new-generation antibiotic drug. And the pharmaceutical companies have to pass on the cost to the consumer. Which they do. That is why a newer antibiotic, such as Ceftum (which is a new antibiotic drug called cefuroxime) from Allenbury's costs around Rs 41 for one 500 mg tablet, whereas the middle-range antimicrobials like cephalexin costs Rs 9.50 for a 500 mg tablet. Compare that to sulphonomides, or cotrimoxazoles like Septran, which costs between 75 paise to Rs 1.50 per tablet depending on its strength.

And these are only the more common antibiotics. Some of the higher-order injectable antibiotics can cost upto Rs 350 per dose, whereas the higher-order tablets can reach upto Rs 90 per tablet.

At what price?

The bill that goes up is the patient's

The problem with overusing antibiotics of course, is quite special, due to the resistance factor. But there are other related problems as well. Price becomes a big factor in the introduction of newer

One of the ways of tackling resistance is to develop missiles that penetrate the shields that bacteria develop around them

And if the Dunkel draft agreement goes through, you can expect drug prices to go through the roof.

It is not just the price factor, however. There is also the question of side effects. While they have undoubtedly played a crucially important role in human health in the last 50 years, antibiotics have also been guilty of generating problematic side effects, most of which are commonly known, but some of which can even be deadly. For instance, the known side effects of the relatively new antibiotic, gentamicin, (available only as an injectable) are nephrotoxicity (which can lead to kidney damage) and ototoxicity, (which can cause deafness).

The rapid obsolesence of old drugs and the corresponding manufacture of new drugs also brings a sort of consumer culture into the drug industry. It only increases the misuse of medicine. Dr S. P. Tekur, an active member of the Drug Action Forum and of the Bangalore-based Community Health Cell, who himself runs a child health clinic, is very disturbed about the widespread irrational use of drugs.

There are so many antibiotics in the market today, with so many variations in side effects, half life and site-effectiveness that it is understandable that doctors themselves are confused. But sometimes, this leads to the dangerous abuse of drugs on an unsuspecting, ill-informed and apathetic public. Doctor Tekur cites the instance of Norfloxacin and Ciprofloxacin, which belong to the family of the recently introduced quinolones. "The recommended dosage per day is 400 mgs twice a day," he says. "They are not meant for children."

Quinolones are contra-indicated for children under 14 because they have been reported to cause damage to the joints of immature animals. "And yet," says Dr Tekur, "this antibiotic is available in 100 mg tablets, which tempt pediatricians to try them on children."

Shocking instances of antibiotic abuse like this expose the complete lack of coordination and implementation of the government's drug policy. But consumer awareness is the only really effective means to stop the misuse of drugs, and especially antibiotics. Because the vested interests of the manufacturer, the prescriber and the dispenser combine to perpetuate this misuse. And it is left to each individual to say, IT'S MY BODY, AFTER ALL. •

Rohini Nilekani/Bangalore