Abstracts of Lectures, Papers, and Posters
(In random order)

Indian Venomous Snakes: The Big 4 or the Big 5?

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For over 100 years it has been accepted by all medical professionals in India that there are only four venomous snakes which are capable of causing medically significant envenomation with life threatening symptoms. These species comprise the so called 'Big Four' of Common Cobra, Common Krait, Russells Viper and Saw Scaled Viper. Whilst the King Cobra and Sea Snakes are known to possess venom capable of causing life threatening symptoms, the number of bites per year rarely exceeds 2 or 3. These are therefore not medically significant.

The Pit Viper family, of which there are approximately 13 species in India, were also thought to be only mildly venomous and incapable of causing life threatening symptoms. Work carried out at Little Flower Hospital in Angamaly, Kerala has however established that at least one member of the Pit Viper family, the Hump-nosed Pit Viper (*Hypnale hypnale*) is capable of causing coagulopathy and acute renal failure. The reason it has escaped attention previously is that it was being systematically mis-identified as the Saw Scaled Viper (*Echis carinatus*)

This presentation will outline symptomatology and epidemiology of bites, as well as treatment protocols for dealing with this hitherto neglected and underestimated species.

Organophosphates: New Antidotes from Old Drugs

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Asia carries a disproportionate burden of illness from acute and chronic toxicity. Organophosphate pesticides contribute substantially to the burden of illness. For many years this class of pesticides had been treated as a relatively homogenous group of chemicals. However it is clear that this is not the case and that there is considerable variation in toxicokinetics and dynamics which produces different clinical syndromes. This has implications for clinical treatment and regulatory and public health responses. Understanding this variation helps us to understand the limitations and also refine our current treatments.

In this setting we need to reassess the role of older antidotes and examine the potential of other therapeutic agents in the treatment of OP poisoning. Many of these agents have been extensively tested in organophosphate poisoned animals and have been used in humans for other indications. They may have important therapeutic role by addressing other mechanisms of poisoning compared to traditional antidotes. Such drugs include clonidine, diazepam and magnesium. These drugs are all included in the SACTRC research agenda The challenge in our region is to deliver treatment that is accessible and affordable. Perhaps the new advances in antidotes will come from well known old drugs.

Lead Poisoning: The Hidden Indian Epidemic

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Lead poisoning has become an epidemic in developing countries as a result of poor environmental conditions and uncontrolled usage of lead for various purposes. It happens to be one of the most neglected aspects of public health though adequate policies are in place, due to lack of implementation by the responsible authorities in these countries. Limited population data from the pilot study carried out by TGF during 1997-2000 is the only documented information in India. Sources and pathways of lead are well understood, and yet preventive technologies are not in place. Lack of awareness about the health hazards caused by lead amongst the users of lead is seen all over the country. Inadequate facilities to monitor both environmental and biological lead have worsened the scenario in India. Air, water and land (even deep ground water) are highly contaminated with lead. Global policies have not addressed the role of developing countries, and also found to have dual policies for known reasons. Poverty on the one hand, and the burgeoning population on the other have added to the gravity of the hidden problem.

With clear understanding on the mechanisms of biological intervention by lead with other essential trace minerals, of late, nutritional intervention has shown the way to a lead safe environment, especially during the growth and development stages. Lead production is on the rise, and usage is also increasing worldwide. Concentration of lead in our environment is constantly increasing. Even though effective treatment and chelating of lead is possible, the economics of treatment is many folds higher when compared to the cost of preventive measures.

Safety of Traditional Medicines

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In recent years, there has been an increase in the use of traditional medicines and cosmetics worldwide as they are considered safe. However, such remedies rarely go through stringent preclinical/clinical toxicity testing. The unsuspecting user usually is unaware of any toxic effects and uses these products in good faith. Often these products contain heavy metals, chemical toxins, bacterial and other contaminants.

Evidence is now rapidly gathering momentum to oppose the common myth, that 'traditional' or 'herbal' equals 'natural' equals non-toxic i.e., 'safe'. An example is the use of traditional remedies in the eye. Analytical data on traditional eye cosmetics/medications used in India and other parts of Asia, and the Middle East, reveals the presence of metals and other contaminants. Another example is that of skin lightening creams sold in shops that contain mercurials. Several such metal containing products are available freely and could be potentially toxic. These can give rise to unsuspected cases of poisonings. Physicians need to be made aware of these possible sources of poisoning.

Along with safety also comes the question of quality and efficacy. Often traditional remedies have false/misleading information on labels. Safety monitoring and regulations for quality control should be made mandatory and such products should have adequate labeling information for the consumer.

The obvious conflict between traditional practitioners and the purists demanding evidence of safety, efficacy and quality needs to be addressed as a priority issue in India and in other parts of the world. Needless to say that cultural and social sensitivities could pose a barrier to such studies.

The Importance of Statistics in Toxicological Research

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Statistics occupies a prominent place in clinical studies, and even more so in non-clinical studies. The reason is that no two animals are similar, and there usually exists a considerable variability between them. There should be some way to assess this variability in order to find the true effect of the treatment, and for this toxicologists rely on statistics. Statistics is a good companion of a toxicologist, which helps gather intended information from a study. But statistics can also be misused to obtain results of one's own choice.

One of the deadly sins that a toxicologist can commit in toxicological studies is 'misuse of statistics'. All guidelines emphasize the selection of appropriate statistical tools for analyzing the data obtained from toxicity studies. Unfortunately, many of the scientists involved in toxicological research do not give enough importance to selecting an appropriate statistical tool to analyze the data. This lecture attempts to explain how different statistical tools affect the interpretation of toxicological data.

Resuscitation in Haemotoxic Snakebite Victims in a Tertiary Hospital in South India: Are D-dimer and FDP Good Prognosticators?

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Introduction

SRM is a tertiary hospital surrounded by 110 villages with a rural agrarian community. Cobra and Saw Scaled Viper bites are common. The latter causes haemotoxicity, including procoagulant activity, and ASV is titrated against haematological responses. We relate our experiences on prognostic value of haematological investigations.

Method

All snakebite victims were admitted to the ICU equipped with ventilators, pulse-oximeters, etc., and an intensivist team trained in BLS/ACLS skills. First aid, severity assessment, and ASV administration with baseline ECG, CXR, and haematological and blood biochemistry were done, including LFT, RFT, BT, CT, APTT, PT, D-dimer, FDP and total fibrinogen. Assessments of patient's vitals were monitored 1/2-hourly; clotting time measured 6-hourly, and subsequent ASV doses administered as required. Repeat D-dimer, FDP and fibrinogen were tested even after clotting time had returned to normal, and ASV stopped. Patients were observed for 48 hours after cessation of ASV therapy, and discharged.

Results

Alterations in fibrinogen, FDP and D-dimer occurred in all the viperine bites but normalized late, long after CT had normalized. ASV was not resumed based on altered FDP/ D-dimer. Patient was discharged once clinically and haematologically stabilized (including FDP/ D-dimer & fibrinogen).

Discussion

Saw scaled viper venom has procoagulants, disintegrins and haemorrhagins. Procoagulants are mainly factor V/ X/IX-activating, prothrombin activating and fibrinogen clotting. Fibrin cross-linking occurs outside the protected environment of platelet plug. In massive envenomation, thrombi formation may cause coronary or cerebral events. Fibrinolysis occurs close on the heels of thrombi formation, causing reduction in total fibrinogen. Hence heparin is considered taboo. ASV was titrated against clotting time alone as a gold standard. ASV need not be wasted based on FDP/D- dimer and fibrinogen.

Poisoning Fatalities in Manipal

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Increasing mortality from poisoning is an issue of growing concern among medical professionals. This study deals with a retrospective analysis of eleven (11) year data of poisoning fatalities in Manipal, India. Of the 354 cases studied suicide topped the list (323 cases). 21-30 years was the most common age group involved. Males predominated. Most of the victims were from rural habitat and they consumed poison in their home. Poisoning was more commonly seen during the winter months. Organophosphorous compounds predominated. In 30.5% of the cases the victims survived for a period of 6-12 hours.

Toxicity Concerns of Medicinal Plants

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Traditional medicinal systems rely heavily on plants and plant-derived products. Herbal remedies have generally been considered safe and complementary, and alternative medicine is becoming popular day by day. However, due to lack of adequate quality control and information, use of these products may sometimes lead to serious local and systemic toxicities. Various herbal drugs have been reported to produce dermatitis, cardiotoxicity, nephrotoxicity, hepatotoxicity, and nephrotoxicity. Besides, herbal medicines prepared from Ginkgo leaf, St. John's Wort and Asian Ginseng root are also known to interact with conventional drugs producing various adverse reactions such as bleeding disorders, phototoxicity, and mania.

The toxic effects of plants such as *Parthenium hysterophorus*, *Datura stramonium*, and *Thevetia neriifolia* upon accidental exposure and *Argemone mexicana* and *Lathyrus sativus* used as adulterants, are well documented. *Calotropis procera*, a wild-growing tropical plant has been used in some traditional medicinal systems for the treatment of various ailments, including ulcers, piles, and tumours. Experimentally, different parts of this plant have been shown to exhibit anti-inflammatory, anti-microbial, anti-malarial, anti-cancer, antipyretic and analgesic properties. The latex, although known for its medicinal properties, has been found to produce hepatotoxicity at higher doses. Accidental exposure to the latex has also been reported to produce inflammatory reactions such as dermatitis, keratitis, and toxic iridocyclitis. We have demonstrated that such an inflammatory response is mediated through both histamine contained in the latex, as well as by release of histamine from mast cells. In addition, synthesis and release of prostaglandins also contributes to this response. Further, antihistamines are more effective in attenuating the pro-inflammatory response elicited by the latex as compared to standard anti-inflammatory drugs.

Thus, it is important to study the toxic effects of plant-derived medicinal products, and to have guidelines for their use in therapeutics.

Profile of Poisoning Cases in Vidarbha Region of Maharashtra

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The present study was carried out at Govt Medical College, Nagpur for the period Jan 2003 to Dec 2004, to evaluate the pattern of poisoning cases in Vidarbha region of Maharashtra. All medicolegal cases of death due to poisoning were studied. In all the cases suicidal deaths were the commonest, followed by accidental and homicidal fatalities. Organophosphorus compound was most commonly encountered. The relevance of age, sex, marital status, occupation, educational status, season, and motive were analyzed in all the cases.

Prevalence of Amphetamine Abuse in the Kingdom of Saudi Arabia

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The National Guard Health Affairs, Saudi Arabia implemented a forensic urine drug testing program in the hospital from October 2003. Urine specimens were screened for amphetamines, barbiturates, benzodiazepines, cannabinoids, cocaine, opiates by CEDIA® reagents of Microgenics Corporation and DRI® reagents for alcohol, using Hitachi automatic analyzers. Confirmation tests were done by ThermoFinnigan GC-MS for all the drugs mentioned above, except alcohol, which was done by Perkin Elmer Head Space GC. In total, 5083 urine specimens were analyzed. Of these, 1039 were found to be suspected positive and the rate of positive case for one or more drugs of abuse was 20.4%. Captagon (Fenethylline) is the most popular drug of abuse in the country. Fenethylline (FNT) metabolizes into amphetamine which can be detected by CEDIA technique and confirmed by GC-MS method. All the 554 specimens, screened positive for amphetamine, were subjected for confirmation by GC-MS method. Samples were derivatized with acetic anhydride and pyridine. Cerilliant® Amphetamine–d11 and MDA–d5 were used as internal standards. Medichem® Urine BTM and DPC® quality controls were used. In GC-MS analysis under SIM mode, the ions monitored were 44, 86 and 118. Out of 554 suspected positives, 539 specimens were confirmed to be positive for amphetamine (97.2%). The study shows that among various types of drugs, amphetamine could be the leading drug of abuse in Saudi Arabia.

Profile of Fatal Poisoning in and around Jamnagar, Gujarat, India

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This paper presents the study of 132 cases of poisoning received in the Dept of Forensic Medicine of M.P. Shah Medical College, Jamnagar, Gujarat for postmortem examination (PME) over a period of one year. Out of 826 autopsies done during this period, 132 (15.98%) cases were that of poisoning. The cases were analyzed in terms of various epidemiological parameters, based on information recorded in the proforma prepared for this purpose. We concluded that the majority of victims were married Hindu males from rural areas, and belonged to low socio-economic strata. Most of the victims died within 1-6 hours of consumption of the poison. Suicidal cases were commoner than accidental cases. No case of homicidal poisoning was noted in the present study.

Chemical analysis of viscera was done in 115 (87.12%) cases (snake bite cases excluded). During the period of the study, we could get the chemical examiner's report in 98 (85.21%) cases. Insecticides topped the list, while snakebites were second in the list of fatal poisoning. This study differs from some of the recent studies in one important aspect: we could get the chemical examiner's report in a significant proportion of the cases. The reports were positive for poison/drug in 90 per cent of the cases.

Serum Drug Level - The Marker for Drug Toxicity & Pharmacogenetics for Personalized Prescriptions: An Overview of the Past, Present and Future

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In the present fast growing scientific technological scenario it is but natural to demand the right medicine at the right dose and therapeutic efficacy, with least side effects by one and all. Bioavailibility studies of the drug being used in therapy could give the physician a clearer picture of the concentration at which the individual will show a therapeutic /toxic effect. No doubt the various pharmaceutical-manufacturing methods introduced recently provides enough scope to reduce the drug concentration in each prescribed drug while increasing the bioavailibility.

Variations in pharmacokinetic properties such as acetylation, oxidation, and hydrolysis, and genetic-metabolic disorders such as glutathione synthase deficiency, glucose 6 phosphate dehydrogenase deficiency etc ., necessitate that therapy be viewed in an individualized manner. This is where pharmacogenetics can help.

Adverse drug reactions are the 4th most common cause of death in the world. One patient is different from another in expressing the ADR in a dose related manner. The rate of ADR is increasing with polyprescriptions, which is due to bioavailibility variations occurring by interaction between the drugs. A first line drug for one need not be necessarily applicable to another due to genetic variation. Bioavailibility in the true sense is to be viewed more critically. No doubt the bioavailibility data gives us an overview of the drug's pharmacokinetic behaviour. It is now clear that much individuality in drug response is inherited: this genetically determined variability in drug response defines the research area known as pharmacogenetics.

Development of new drugs for individuals with specific genotypes is "drug statification" which might take up a grand lobby in the future. All the major drug metabolizing P450 enzymes have been identified and cloned, and the major gene variants that cause inter-individual variability in drug response are related to adverse drug reactions. This information now provides the basis for the use of predictive pharmacogenetics to yield drug therapies that are more efficient and safer. Pharmacogenetics testing as it advances will substantially reduce the need for hospitalization due to Adverse Drug Events/Toxicity, and its associated costs.

Incidence and Pattern of Arthropod Envenomation in an Indian Teaching Hospital

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Epidemiological data on arthropod envenomation are generally lacking in developing countries such as India. The aim of this study was to assess the five years' incidence and pattern of arthropod envenomation in an Indian Teaching Hospital. The records of patients diagnosed under T 63.2, T 63.3, and T 63.4 as per ICD-10, between 2000 and 2004 were scrutinized. Demographic data and other information like type of arthropod envenomation, systemic complications, length of hospitalization, medical treatment, and status at discharge were obtained. A total number of 17 patients were studied. Bee sting cases formed 47% of the total cases, followed by scorpion stings (29%).

*Cause of Death in Cases of Poisoning: Doctor's Dilemma

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This paper deals with some of the dilemmas facing an autopsy surgeon when confronted with a case of poisoning fatality. Generally, autopsy findings are not specifically diagnostic for poisoning in most of the cases. Chemical analysis, which can give conclusive results, is unfortunately subject to inordinate delays due to various reasons. When finally the report does arrive, it may transpire that the analysis did not reveal the presence of any poison. In such cases, furnishing an opinion relating to the cause of death becomes problematic. Though the death can be certified as having occurred from unknown or undetermined causes, the police and judicial authorities, besides the insurance companies in insured cases, would not be satisfied and would like to be provided with an unequivocal cause of death. The question arises, can the autopsy surgeon furnish such an opinion? The answer surprisingly is yes. As to how this is possible in most cases forms the crux of this paper.

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* Winner of Best Paper Award in the category of Forensic Toxicology

Proficiency Testing for Urinary Drug Screening

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Providing the best patient care requires laboratories to strive for the highest performance. One of the means for the same would be participating in the external proficiency testing programs. We report our laboratory's performance in the last three years in the urinary toxicology survey (UT) of College of American Pathologists (CAP). The lab receives three shipments of 5 samples each per year. CAP evaluations are based on scientific committee review, and participants are marked incorrect only if they have reported false positive results. We have reported 12 false positives, 5 in the year 2002, 6 in 2003 and 1 in 2004. Though false negatives are not ranked by CAP we went back into the details of each and reasoned out the same. They were either due to method limitations, or the lab's policy of not identifying the individual compounds like methylenedioxy methamphetamine, oxazepam, nordiazepam, and others, but reporting as a group like amphetamines, benzodiazepines, etc., and also due to lack of experience with a few drugs in our setting (verapamil, cimetidine, hydroxyzine, etc). Thus, thorough evaluation of the CAP results and timely corrective actions help us in gaining confidence and experience with new drugs and also know our method limitations. Hence every patient sample in the lab is analyzed and reported with thorough history evaluation and technical competence.

Detection and Identification of Lorazepam in Biological Samples

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Hypnotic/sedative use in drug related offences is on the rise, as evidenced from the trend of cases encountered in forensic laboratories. The benzodiazepine group of drugs is most commonly encountered in such forensic cases. The onset of action of these drugs is immediate, and is therefore favoured by the culprits to commit crimes such as theft, robbery of passengers in public transport, and sexual offences. Of these drugs, lorazepam and diazepam possess properties that can lead to their rapid deterioration. Successful detection depends on the dose and time of administration, as well on age, sex, and other aspects of the person concerned. The chance of detection in such a situation increases with the type of instrument and technique adopted to identify the drug from the complex matrix. The detection of lorazepam by TLC, HPLC, and GC is reported in this study.

A dead body was found with a syringe nearby. The doctor who was called to the scene reported the person dead, and preserved relevant viscera for chemical analysis. The autopsy could not confirm the injection of any drug. After routine chemical analysis, the presence of a basic drug was deduced. Modified TLC system was done - Chloroform: Methanol: ammonia:: 90:10:1, Sprayed with Dragon-droff reagent and confirmed by FTIR, KBR spectra and library match. GC-MS was done with Column 5% phenyl methyl silicone, injector port 200, interface 200 degree, EI mode, 70 eV, Mass range 40-630 amu. Oven temperature 70ºC for 1min, @ 5ºC to 200ºC hold 1min, @ 10ºC up to 250ºC, carrier gas helium 1ml/min, ionization voltage: 70 eV, EI mode.

The analytical methodology followed could conclusively identify the presence of lorazepam in the biological samples, and the recovered syringe at the scene of crime.

Suicidal Death due to Severe Chloroquine Overdose

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Chloroquine poisoning is not commonly encountered in toxicological practice. A case is presented where toxic overdose of chloroquine was ingested as a means of suicide which proved rapidly fatal. Although the exact amount of chloroquine ingested could not be ascertained, blood and bile concentrations of chloroquine were highly lethal and confirmed death due to severe overdose.

Development of a Method for Isolation and Identification of Organophosphorus Insecticides from Biological Matrices Using GC-MS

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Pesticides help to augment agricultural productivity by reducing crop loss. Organophosphate pesticides are commonly used to control many biting or sucking insect pests of agricultural crops, primarily cotton, vegetables, and food grains. Because of easy availability, they are widely used by farmers in South India to commit suicide. They are soluble in most organic solvents like n-Hexane, dichloromethane, 2-propanol, and toluene. They act by inhibiting the enzyme acetylcholinesterase resulting in the stimulation of central nervous system, parasympathetic nervous system, and the motor nerves.

The new method of isolation from a different matrix was compared with the existing method by separation, cleanup, and identification using modified GC-MS. Different organic solvents (hexane, dichloromethane, and toluene) were tried for the isolation and extraction of organophosphorous compounds such as methyl parathion, chlorpyriphos, and malathion from biological matrices. TLC with different solvents were tried and visualized with chromogenic reagents for semi qualitative analysis. The samples were qualitatively analyzed and the identity of the sample was confirmed by the mass fragmentation pattern of the samples compared with the standard Mass Spectrum (NIST) from the library. The multiresidue method of organophosphorous detection was modified, and the samples were analysed using GC-MS. The standards and the recovery studies of the samples were carried out for dichlorvos, phosheptanex, phosdrin, phorate, disystox, phosmadion, methyl parathion, malathion, chlorpyriphos, and quinalphos.

The retention times for the above pesticides were standardized and the sample extracts from biological matrices were compared and spectrum identified.

*Retrospective Analysis of Urine Drug Screening

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We carried out a retrospective analysis of urinary drug screen data of our lab for the past ten years. Around 1605 samples (116 paediatric and 1489 adult) were screened by immunometric assays followed by TLC using TOXILAB kit. The study was conducted to determine the type of requisition, pattern of results, and efficiency of the lab in serving patient management.

Approximately 20% of the adult age group requests were for pre-employment screening. The remaining were for detecting drugs either for abuse, overdose, or deliberate poisoning. Negative screen was obtained in 63% of the cases. The remaining 37% (n=586) were positive either for one or more drugs. Benzodiazepines were detected in 400 samples, and on clinical correlation were found to be the most popular drug group for self-poisoning due to its easy availability. Other drugs detected included anti epileptics like phenytoin, phenobarbitone, and carbamazepine in 123, TCAs in 54, opiates in 42, and acetaminophen (paracetamol) in 29 patients who were either on medication or had attempted overdose or poisoning. Amongst the drugs of abuse, THC was detected in 35, amphetamines in 5, and cocaine, phencyclidine and methadone in one each. A miscellaneous group of drugs comprising antacids, antimalarials, anaesthetics, etc., were reported in a few cases.

We started the service by receiving only 6 samples in the year 1995 and have reached over 300 in 2004 suggesting the efficacy of this particular test in clinical setting. However the need for the confirmatory techniques like GC/MS still remains.

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* Winner of Best Poster Award

Toxicology of Materials and Medical Devices: An Overview

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The term 'medical device' may conjure up visions of complex, highly technical equipment used in acute hospital care. Medical device covers a broad range of products including the products used everyday in most health care settings such as needles, syringes, infusion pumps, endoscopes, examination gloves, dressings and blood glucose meters. Biomaterials and medical devices constitute an extremely diverse, heterogeneous category of items, because the use of these products normally entails their direct or indirect contact with patients; there is an obligation on the part of manufacturers to establish the safety of their products before they are marketed.
Until recently, the regulations governing the manufacture and sale of medical devices varied greatly among countries. Since January 1995, medical devices to be marketed in the European Union (EU) have been required to comply with EU Medical Devices Directive 93/42/ EEC, which specifies requirements for safety assessment issues. The purpose of the directive is to promote a single European market for trade in medical devices, while ensuring that users and patients are not exposed to unnecessary risks. Biological evaluation of medical devices depends on the material used in the device, the intended body contact, and the duration of contact. The ISO 10993-1 document divides medical devices into three main categories: surface devices, externally communicating devices, and implant devices. Each category is further divided into subcategories according to the type of contact to which the patient is exposed.
Due to the diversity of medical devices, it is recognized that not all the tests identified in a category will be necessary or practical for any given device. It is indispensable for testing that each device shall be considered on its own merits. This part of ISO clearly states that the test results should be reproducible by inter laboratory evaluation, as well as repeatable by intra laboratory methods.

Profile of Poisoning Cases Reported by State Chemical Laboratory, Punjab

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Punjab is predominantly an agricultural state where all kinds of pesticides are easily available because of overwhelming use in agriculture. A number of unnatural deaths comprising suicides, homicides, and accidental deaths occur in the state every year. The alleged modes of death include poisoning, intake of wrong medicines, intoxication, illness, hanging, strangulation, throttling, drowning, electrical injuries, burns, animal bites, other injuries, etc., but all deaths are not actually due to the causes mentioned as alleged causes. In many of these cases, the actual cause of death is finally found to be poisoning though some other cause like drowning, illness, etc., is projected as an alleged cause to subvert the investigation.

This study is an attempt to create awareness amongst doctors conducting autopsies about the incidence of poisoning in such unnatural deaths so that the postmortem examination is conducted keeping in view the possibility of death due to poisoning, even if the alleged cause is something else. One thousand deaths reported to the Punjab State Chemical Laboratory have been studied for the poisoning profile, in which comparisons have been made regarding the incidence of various poisons, sex-wise distribution, age groups, etc.

Dilemmas in the Management of Snakebite: A Retrospective Study at Goa Medical College

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Snakebite envenomation is a common medical emergency encountered in the tropics, and an estimated 35000 to 50000 people die of snakebite every year in India. However, there is not much information available in Indian medical literature on the standard management of snakebite.

We report a one-year retrospective study (January 2004 to December 2004) of 118 cases brought to Goa Medical College Hospital for the treatment of snakebite. There were 6 fatalities of admitted patients, whereas 3 persons died before their arrival at the medical college hospital. At undergraduate level, medical students in India are taught the management of snakebite in the Toxicology section of Forensic Medicine. In actual practice, these patients are managed by clinical departments such as Paediatrics, Medicine, or Surgery.

The results of this study (relating to the diagnosis, identification of snake, laboratory investigations, treatment, and medico-legal aspects) in relation to the actual utility of available information in standard Indian texts of Forensic Medicine & Toxicology, and dilemmas arising therefrom are discussed.

A brief account of three interesting cases encountered during the course of the study is also included.

Fatal Accidental Strychnine Poisoning in Mother and Son

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A case is reported where-in a mother and son died soon after consuming a herbal decoction bought from a traditional vaidya for the relief of abdominal complaints. Postmortem examination revealed reddish watery fluid oozing out of the corners of their mouths, and intense congestion of organs, including the stomach, intestine, liver, spleen, kidneys, lungs, and brain. Chemical analysis was decided to be undertaken, as no conclusion could be drawn from the postmortem findings. This revealed the presence of strychnos nux vomica alkaloids (strychnine and brucine) in the stomach contents and other viscera. Death was apparently due to accidental strychnine poisoning.

Strychnine is reported to be used by vaidyas and hakims in their herbal multi-ingredient preparations for a variety of disorders. Ingestion of these medicinal powders could result in fatal accidental poisoning. Strychnine, it should be remembered, is one of the most deadly poisons known. Brucine is comparatively less toxic. Caution should be exercised while visiting traditional hakims or vaidyas who sell crude plants or herbal powders, which could pose a threat to life.

Suicidal Poisoning among Medical Professionals - A Case Report

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In medical literature, there is mention of certain toxins as "ideal suicidal poisons" and "ideal homicidal poisons" which are highly debatable concepts. Rapid development has taken place in the fields of science and technology, and in methods of information dissemination over the past decade or two, greatly enhancing accessibility of deadly chemicals and toxins to the common man. This is also true with reference to pharmaceutical agents such as sedatives and anaesthetics. Toxins formerly classified in the manner mentioned are no more relevant today.

We report a case where police broke in to a hotel room, which was locked from inside, and recovered two dead bodies, of a young tourist couple, in a slightly decomposed state. The room was undisturbed. There were scalp vein needles present in situ on the backs of the hands of both dead bodies. There was also a 5 c.c. syringe attached to the scalp vein needle stuck in the hand of the female dead body. A few vials of thiopentone sodium and some sedative tablets were found at the bedside. The first impression on the part of the police was that it was a suicide pact by the deceased who were probably associated with the medical profession in some way.

When the police tried to contact the relatives of the couple based on names and addresses given by the couple in the hotel register at the time of check-in, it was revealed that these names and addresses were fake. Hence, the dead bodies remained in the morgue as unidentified bodies for a long period until finally the female was identified as a nurse who had been working in a surgical nursing home. Further investigation revealed that it was a case of double suicide involving this woman with a person having an extramarital relationship with her. The various toxicological and medicolegal aspects of this unusual case (where-in the method of suicide had helped in establishing the identities of the deceased) will be discussed.

Analysis of Poisoning Deaths in Mangalore, Coastal Karnataka

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A prospective study to determine the various factors involved in poisoning deaths was conducted at the Government Wenlock Hospital Mortuary attached to the Department of Forensic Medicine and Toxicology, Kasturba Medical College, Mangalore. During the study period extending from May 2004 to September 2005, 58 autopsied fatal poisoning cases were recorded out of 819 medicolegal autopsies. Poisoning deaths constituted 7.1% of the total number of autopsies conducted. Suicidal poisoning accounted for 69% of the fatal poisonings, followed by accidental cases (31%). 53.4% of the fatalities were due to pesticide poisoning. 86.2% of the victims consumed the poison at their residence. 69% of cases occurred in rural areas. There was a clear male preponderance over female victims in the ratio of 2.9:1. 58.6% of cases were seen in the vulnerable age group of 21-40 years. Suggestions are offered to minimize the incidence of pesticide poisoning, which poses a unique risk to the population of the study area.

Development of Toxicology Laboratories, Poison Information Centres, and Poison Centers in India and Abroad

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Poisoning in some form or the other has been the bane of mankind since time immemorial all over the world. Its incidence however is increasing all over the world day by day. According to the WHO, about 3 million cases of acute poisoning occur annually all over the world. Out of all the fatal poisoning cases, a significant majority occurs in developing countries.

Acute poisoning presents as medical emergencies at all levels of health care, and the personnel involved in health care should be aware of the critical care and management of such cases.

Pesticide poisoning is associated with high morbidity and mortality. Education of pesticide handlers about safe practices can prevent accidental poisoning to a large extent. Immediate and effective first aid can be life saving in many cases, and can be carried out at the primary health care level.

Poison information centers and poison control centers can play an important role in the management of poisoning cases and also in their prevention. Clinical diagnosis of poisoning is not always easy. For instance, there are a large number of poisons, particularly pesticides, which are available in various brand names and in varying combinations. Therefore toxicology laboratories are needed to identify the exact nature of poisons to arrive at the correct diagnosis, which is important for administering proper treatment by giving appropriate antidotes.

This explains the present trend all over the world, including India, to establish poison information centers and poison control centers along with toxicology laboratories, the limiting factor being the availability of facilities and resources.

Correlation Between Postmortem Diagnosis and Survival Time in Poisoning Deaths

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Every death resulting from poisoning has to be investigated to establish the exact cause of death. Difficulties in clinical diagnosis of poisoning are well known owing to the presence of nonspecific signs and symptoms in many a case, and the predilection of some cases to mimic natural diseases. The same situation prevails in medicolegal investigations, and the forensic pathologist is not uncommonly perplexed due to nonspecific autopsy findings. Some poisons are retained in the body for a long time after death, while others are rapidly metabolized and excreted, or undergo deterioration in the postmortem period.

This study was undertaken to find out the effect of survival time on autopsy findings and chemical analysis of body tissue and body fluids in poisoning deaths. Most of the cases studied were deaths due to exposure to pesticides. Toxicological analysis was positive for some poison or the other in 70% of cases. Kerosene-like odour, which is characteristic of organophosphate poisoning, could be detected up to 3 days in some cases. In 94% of the cases, chemical analysis was positive up to three days after death. Thereafter, the chance of detection of poison in routine viscera decreases to 50%.

Some suggestions have also been made to aid postmortem diagnosis of poisoning cases.

Aggressive versus Non-aggressive Management of Copper Sulphate Poisoning: A Comparative Study

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Aim

To compare two protocols of management in acute copper sulphate ($CuSo_4$) poisoning. Protocol I is traditional (aggressive management) with gastric lavage, forced alkaline diuresis (FAD) and D-penicillamine, while Protocol II (non-aggressive management) avoids gastric lavage and FAD, and treatment essentially involves administration of demulcent along with adequate intravenous fluids and D-penicillamine.

Patients and Methods

Of the total 124 patients with acute $CuSo_4$ poisoning, 84 were treated by Protocol I and 40 patients by Protocol II. The results of the two protocols were compared for mortality and morbidity due to gastrointestinal haemorrhage, intravascular haemolysis (IVH), anaemia, jaundice, renal failure, rhabdomyolysis, ARDS, and pancreatitis.

Results

Patients treated under Protocol I (aggressive) had a mortality of 7.4% compared to 2.5% with Protocol II (non-aggressive) (p value 0.3). Morbidity with Protocol I revealed IVH 48.8%, jaundice 29.8%, renal failure 14.3%, G.I. Bleed 11.9%, pancreatitis 2.5% and ARDS 1.2% while with Protocol II it was jaundice 5%, anaemia 2.5% and G.I .Bleed 2.5%. Overall morbidity with Protocol I was 64.28% compared to 22.5% for Protocol II which is statistically significant (p value 0.001).

Conclusion

Protocol II (non-aggressive management of acute $CuSo_4$) involving administration of demulcent, adequate IV fluids and chelating with D-penicillamine was shown to reduce morbidity and mortality significantly.

Hepatotoxic Effects of Some Commonly Used Drugs

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In addition to the usual association with insulin resistance, type II diabetes, central obesity, and hypertriglyceridaemia, nonalcoholic steatohepatitis (NASH) has been associated with several drugs and toxins. Drug-induced steatohepatitis is usually the result of prolonged therapy. It resembles alcoholic liver disease more closely than NASH associated with diabetes and the insulin resistance syndrome. The toxic mechanism appears to involve mitochondrial injury, which causes steatosis because of impaired β-oxidation of fatty acids, and leads to generation of reactive oxygen species and ATP depletion. If a drug is suspected, it is important to determine the dose, route, and duration of therapy, as well as possible interactions.

The Role of Low-Level Lead Exposure on Neurochemical, Neurobehavioral, and Morphological Alterations of the Developing Rat Brain

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Lead is found in small but appreciable quantities in air, soil, drinking water, and food. Exposure to such amounts of lead does not cause acute lead toxicity, but produces subtle effects, particularly in children. The CDC, USA advocates "safe" or "acceptable" levels of blood lead up to 10mcg/dl, while osha declares blood lead levels up to 40mcg/dl as "safe" or "acceptable" in the occupationally exposed. The objective of this study was to see if blood levels considered "safe" can cause damage to the developing brain producing neurochemical, neurobehavioral, and morphological defects.

Albino wistar rats were used, which were divided into control and lead-treated groups. The control group was given unleaded water, while the lead-treated group was given 50ppm lead acetate in drinking water. Both these groups were maintained for 45 days. On day 45, the experimental animals were weighed, subjected to a passive avoidance test to assess their neurobehavioral faculty, and their blood analysed for ZPP and lead. They were then sacrificed and the following neurotransmitters: norepinephrine, dopamine, and serotonin, together with their metabolites (mhpg, dopac and 5-hiaa respectively), were estimated in three brain areas - frontal cortex, hippocampus, and striatum by HPLC-ECD. Sections from these areas were also sent for histopathology.

It was found that blood lead, ZPP, norepinephrine, serotonin, mhpg, and 5-hiaa were increased, while dopamine and dopac were decreased generally. Passive avoidance test showed memory and learning deficits. Histopathology revealed extracellular oedema and pas+ve stained granules in the perivascular astrocytes.

This study shows that even "safe" or "acceptable" blood lead levels produce neurochemical, neurobehavioral, and morphological alterations.

A Preliminary Study of Knowledge and Attitude of Medical Teachers/Professionals Towards Status of Medical Toxicology in the Indian Medical Curriculum

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Medical professionals, particularly clinicians, for decades have realized and complained of gross neglect of the discipline of medical toxicology in India. Various academic fora of medical professionals have been discussing (albeit non-formally) ways and means to improve the status of this important discipline of medicine. A survey was undertaken to determine the knowledge and attitude of medical teachers/professionals working at S.S. Medical College, Rewa (M.P.) and its associated hospital towards forensic and clinical toxicology, and their status in undergraduate medical curriculum. Postgraduate medical students of the departments of internal medicine, anaesthesiology, pharmacology, and paediatrics along with casualty medical officers were included as respondents for the survey. The responses are discussed in the paper.

Comparative Analysis of Organochlorine and Organophosphate Pesticides on the Learning Ability and Sustained Swimming Capacity of a Freshwater Fish

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The behavioural effect of short-term static exposure (120 hours) to organochlorine (Dicofol) and organophosphate (Methyl parathion) pesticides were recorded in Climbing Perch (*Anabas testudineus*), a freshwater fish. The behaviours analyzed included associative learning ability and sustained swimming capacity against water current. The learning task given to the fish was to associate the neutral stimulus (air bubble) with unconditioned stimulus (food) in a two-chambered aquarium with a gate on the partition wall. The test fish, starved for twenty four hours, had to cross the gate to reach the food provided in the side chamber.

The control fish were able to associate air bubbles with food and crossed the gate to reach the side chamber within ten trials. In contrast, the fish exposed to the organochlorine and organophosphate pesticides failed to associate the neutral stimulus with the food, or to learn the position of the gate, regardless of the chemical nature of the pesticide.

Endurance (reflected in the sustained swimming ability against water current) was tested in a specially designed apparatus that could generate constant and measurable water flow. Both pesticides considerably reduced the endurance of the fish. The results are discussed in the light of alteration in behaviour, and its influence on adaptive ability of an organism.

*Toxic Effects of Alcohol on Brain- An Overview

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Multiple factors can influence the brain as a consequence of alcohol consumption. Alcoholism-related brain damage may be influenced by an individual's age, gender, drinking history, and nutrition, as well as by the vulnerability of specific areas of brain. Degeneration of neuronal cells is associated with alcohol pathology. One of the proposed mechanisms of alcohol-induced brain damage is the effect of increased oxidative stress through the generation of ROS, or the reduction of antioxidant levels, causing damage to mitochondria and altering the functions of glial cells.

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* Winner of Best Paper Award in the category of Clinical Toxicology

Pharmacological Modulation of Iron-induced Renal Toxicity in Rats by L-Arginine, a NO Precursor

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Objective
The role of nitric oxide (NO) in acute renal failure (ARF) is debatable. In the present study, we investigated the effect of acute administration of NO precursor, L-Arginine and NO synthase inhibitor, N(omega)-L-arginine methyl ester (L-NAME) in Fe-NTA model of renal toxicity.

Method
Rats were pretreated with L-Arginine (125mg/kg, I.P.) and L-NAME (10mg/kg, I.P.) prior to administration of Fe-NTA (8mg iron/kg body weight, I.P.) to determine the urea and creatinine levels along with biochemical analysis of oxidative stress.

Results
Fe-NTA administration markedly increased a BUN and serum creatinine level which was coupled with a marked lipid peroxidation, and reduced activity of glutathione and tissue nitrite levels of rat kidneys. Concomitant treatment with L-Arginine significantly reduced the serum creatinine and BUN levels, reduced lipid peroxidation in a significant manner, restored levels of reduced glutathione and increased tissue nitrite levels. Prior administration of L-NAME reversed the effects produced by L-Arginine.

Conclusion
These findings strongly suggest that nitric oxide plays a significant role in the pathophysiology of iron-induced renal failure, and administration of NO donors can be valuable in the treatment of ARF.

Reliability of the Forensic Science Laboratory in Clinical Poisoning Cases

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A nursing student was admitted to our hospital with a history of 'deep sleep' said to have been caused by a soft drink in which some white powder was discernible. Despite supportive and symptomatic measures, the patient did not improve over the next three days. Gastric lavage had been done on admission, and this was sent to the forensic science laboratory (FSL) for identification of the incriminating agent. The FSL report indicated the presence of paracetamol, but the signs, symptoms and investigations were not in favour of paracetamol poisoning. The case was treated for barbiturate poisoning based on the clinical picture, and the results were very good. Complete recovery took place on the 5th day.

Unusual Case of Carbolic Acid Poisoning

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Phenol (carbolic acid) being a commonly used disinfectant in daily life due to its widespread use in hospitals, hotels, and homes is available freely in the market. Even though it is very toxic, it is a cheap alternative to other branded, more effective and safer products. Cases of accidental ingestion are reported periodically because of its ubiquitous availability.

In this case, a servant's child was playing in a corridor nearby, while the mother was preparing phenol by mixing together the required agents. When the ball with which the child was playing fell into the bucket accidentally, an attempt was made to retrieve it. In the process, the child slipped into the bucket. The child was rescued immediately and taken to hospital. In spite of adequate medical care, the child died on the third day following admission. Death had occurred due to cutaneous absorption of carbolic acid.

Genomics and Genetics: A Promise Towards Improving Treatment

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Modern medicine has changed the way in which diseases are managed and drugs administered. Adverse Drug Reaction (ADR): 3 simple words convey little of the horror of a severe reaction to a prescribed drug. Currently there is no way to determine whether a patient will respond well, badly, or not at all to a particular medication. Here, genovigilance plays a crucial role.

Pharmacogenomics is a dynamic, clinical, and scientific discipline which plays a crucial role in relation to the challenges posed by adverse effects of medicines. Pharmacovigilance serves to highlight the need for effective drug monitoring. Through out the human genome are millions of discrete one-letter variations known as single nucleotide polymorphisms (SNPs), which are used as a diagnostic tool to predict a person's drug response. Pre-screening should allow clinical trials to be smaller in size, faster, and less expensive, so that the consumer could benefit from reduced drug costs. Predictive genotyping can improve drug response and minimize ADRs. The challenges and issues in pharmacogenomics are of great importance. Collaboration between Universities, Medical Schools, Health professionals (i.e., clinicians and academicians), will help solve many problems and educate the common man about ADRs in general.

Characteristics of Poisoning Cases

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Background
Poisoning is a medical emergency, but the characteristics vary from place to place.

Objectives
To find out the demographic factors, nature of poison consumed, and clinical and social aspects of poisoning.

Methodology
A prospective cross-sectional study was attempted to screen 194 consecutive cases of poisoning admitted to the medical wards of our hospital over a period of 3 months after obtaining informed consent. The data were analyzed statistically.

Results
There were 104 males (mean age-29.9yrs) and 90 females (24.8 yrs). All belonged to low socioeconomic status (manual workers predominantly). 7% were students. Place of consumption was home (67.5%), roadside (20%) and work area (12.3%). The poisons used were pesticides (48.45%), plant materials (26.28%), chemicals (12.88%), pharmacologic agents (10.31%) and unknown materials (2.06%). Only 56.2% were aware of other poisons. Previous attempts were noticed in 5 cases. Two-thirds consumed poison during day time. 126 consumed poison on empty stomach. Family history was elicited in 11, and positive history among neighbours or friends in 38. Reasons for selecting the poison were availability (60%), familiarity (43.8%), toxicity (24.7%), and others (5.2%). The reasons for consuming poisons included family problems (49.48%), poverty (14.95%), jilted love (9.28%), work problems (9.28%), physical illness (5.15%), failure in examinations (4.12%), mental illness (3.6%), accidental (3.09%), and as a suicide threat (1.03%).

Pattern of Deaths due to Poisoning at Civil Hospital Ahmedabad

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This study highlights the pattern of poisoning in and around Ahmedabad city of Gujarat State by analyzing 5296 autopsies done at the mortuary of Civil Hospital, Ahmedabad during the period 2002-2003, of which 410 were cases of poisoning. Most of these poisoning deaths were suicidal in nature. The incidence, manner, distribution in relation to age and sex, etc., are discussed in detail, and relevant conclusions drawn.

A Study on Polonium-210 Distribution and Internal Radiation Dose to the Fisherman due to Consumption of Koraiyar River Food, Tiruchirapalli – India

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Man has been continuously exposed to natural radiation since his appearance on Earth. The radioactive substances occurring originally in the lithosphere or hydrosphere - some of the natural radionuclides ^{238}U series (^{226}Ra, ^{210}Pb) and those of the ^{232}Th series are (^{228}Ra) considered important either from the point of view of toxicology, or for their special accumulation behaviour in the environment. The natural alpha emitter ^{210}Po ($T_{1/2}$ = 138.4days) is of radio-ecological interest for a number of reasons, but mainly because of its large contribution (>90%) to natural radiation dose received by many species. It is toxic to living systems, and is accumulated strongly by organisms and transferred via food along a tropic chain. River water is used for irrigation, and for industrial and domestic uses. In the present work the distribution of naturally occurring alpha emitting radionuclides such as ^{210}Po in the environmental matrices of Koraiyar river (Tiruchirapalli, Tamilnadu) and its internal radiation dose due to the consumption of these river food to the fisherman was studied.

Koraiyar is a seasonal river and is 5 Km away from Tiruchirappalli. The river water is used for washing purpose, and hence is called the dhoby river. In the Koraiyar river, effluents of various industries and Tiruchirappalli's treated sewage water are mixed. Samples of water, sediment, crabs, and fishes were collected and subjected to the analyses for ^{210}Po activity. The suspected ^{210}Po concentration in Koraiyar river water was 0.75 mBq/l and in sediment sample 3.1 Bq/Kg. ^{210}Po activity in crab muscle and exoskeleton was 43.92 Bq/Kg and 11.34 Bq/Kg, and in the ^{210}Po activity in fishes ranged from 45.29 to 8.87 Bq/Kg in muscle and 25.09 to 4.76 Bq/Kg in bone.

The major route of radionuclide entry in organisms is through food or through ambient water. Further, the gill membranes may play a predominant role in the direct absorption of radionuclides from water. Among the fish *Clarias batrachus* showed higher activity. Fishes are potentially a significant pathway for transfer of radionuclides to humans. Lower concentration of ^{210}Po in muscle is important in humans who consume mostly the muscle of fish. Concentration factor of ^{210}Po in edible portion of fish from river water worked out to be 1.3 x 10^3 to 6.0 x 10^4. Radiation dose to the fisherman has been evaluated on the basic of dietary intake of fish from the Koraiyar river, and varied from 6.39 to 54.35 ìSv/y. In general, the radiation dose due to ^{210}Po received by the fisherman (Sum 0.16 mSv/y) is well below the maximum permissible dose of 5 mSv/y.

Clinical Profile and Autopsy Findings in Aluminium Phosphide Poisoning

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This retrospective study was carried out at the Govt. Medical College, Nagpur and involved 21 cases of aluminium phosphide poisoning. The cases were analyzed in terms of age, sex, duration of survival, clinical profile, biochemical parameters, and autopsy findings.

The study population comprised 16 males and 5 females, and their age ranged from 15 years to 50 years (average 29.1). 18 persons (85.71%) were in the younger age group (<40 years). The interval between ingestion and admission to hospital ranged from 1 hour to 8 hours (average 3.9 hours), and the period of survival ranged from 3 hours to 78 hours (average 29 hours). 90.47% patients presented with a history of vomiting and loose motions, and 63.15% were in shock (systolic BP ≤90mm Hg) at the time of admission.

Autopsy findings revealed congested organs, pulmonary oedema, and bright red fluid blood. Bilateral pleural effusions were noted in one case, and bleeding diathesis in eight cases. Clinically, apart from persistent hypotension, other findings did not help in differentiating aluminium phosphide poisoning from other toxic causes.

Mutagenicity and Teratogenecity Testing of Drugs using Plants as Experimental Models

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Objective

To test mutagenicity and teratogenecity of drugs in plants.

Material and Methods

Allium cepa (onion) of known weight is grown first in distilled water at room temperature for three days and later shifted to the drug solution for another three days at room temperature. On the sixth day, the onion is kept in pure water for one more day. The grown roots were then sectioned and stained using Aceto Orecein and studied for abnormal chromosomal morphologies.

Results

Growth in control onions showed all stages of cell division, but when compared with that of onions grown with drugs like thalidomide, chlorpromazine, thyroid drugs, imipramine, oestrogen, cortisone, tetracycline, methotrexate, caffeine, and ergotamine showed altered cell division like cell breakages, chromosome breakages and also abnormal cell divisions. Placebo drugs like calcium channel blockers which had no teratogenic effect in man showed normal cell division and resembled that of the cell division of the control.

Conclusion

The chromosomal study in this model was highly sensitive to both the drugs which produced mutagenicity and teratogenecity in humans, as well as in animals.

Inverse Relationship between Zinc Protoporphyrin and Haemoglobin does not make any difference in Hair Lead Level

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A cross sectional study was performed to determine the corelation between zinc protoporphyrin (ZPP) and hair lead (PbH) levels of workers in lead prone areas (n=70) and non-lead areas (n=100) in Bokaro Steel Plant. Two categories of ZPP values were stabilized - those below 6.0 microgram/gm of Hb, and those above it. A linear regression analysis was performed to corelate ZPP and Hb, and showed an inverse relationship ($p<0.02$) between them in both the groups. After chelation therapy however, this inverse relationship did not make any difference in hair lead level ($p<0.05$).

So ZPP estimation may be used only for screening of lead poisoning cases or iron deficiency anaemia, but for confirmation of lead toxicity, hair lead (PbH) estimation is essential.

Venomous Snakebite - Lessons Learnt

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Venomous snakebites have not been adequately evaluated in this country, and the management of such bites has always generated debates and discussions. A 5-year analysis of 96 cases of envenomation by snakes of Elapidae family revealed that the majority of the patients belonged to the 15 to 45 year age group. About 75% of the patients were males. Most patients of the study group had neuroparalytic signs and symptoms, which differed from those who had haemolytic manifestations (not undertaken for analysis).

Because there are no clear-cut guidelines to prescribe the quantum of anti-snake venom (ASV), clinical signs were evaluated to evolve criteria. The average number of ASV (polyvalent) vials consumed was 17 and 13 respectively for those under ventilatory support, and those who were unconscious. There were 4 patients who required more than 100 vials of ASV, one patient needing as many as 180 vials to overcome the ventilator and depression of consciousness.

It is hoped that this study will try to pave the way for a more economical and judicious use of ASV.

Accidental Poisoning with Herbs having Medicinal and Poisonous Effects and its Prevention

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Every foodstuff or medicinal agent can be a poison, just as any poison can be a medicine depending on the mode and intention with which it is given or taken. In India, the prevalence of accidental poisoning from therapeutic agents derived from medicinal herbs is not very high, but the crisis is real, and that has to be taken into consideration. A part of this paper concerns a case of aconite poisoning from Allana College of Pharmacy, Pune. The patient who had taken a root of aconite accidentally during the course of a practical exercise manifested typical signs and symptoms of aconite poisoning.

In India some herbs are used as medicine in the Ayurvedic and Unani systems of Medicine, which have poisonous effects also. But when these poisonous effects of the plants are not destroyed through proper methods of processing, accidental toxicity can result in an individual. The methods of destroying the poisonous effects of these herbs used by Unani system of Medicine are also discussed in this paper.

Quality Control of Poison Information Services Provided by a Clinical Pharmacy Department in Kasturba Hospital, Manipal - A Three-year Experience

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Aim
Provider based continuous evaluation of the information services is essential to upgrade the quality of poison information services.

Materials and Methods
A retrospective evaluation of the poison information service was done from request and documentation forms over a period of three years from January 2002 to December 2004. The quality of all the poison information services from the provider's perspective was analysed using the guidelines from DSE/WHO seminar. The evaluation was based on parameters like background of enquirers and patients, the time frame to reply, mode of receipt, adequacy of references consultation, meeting the inquirer's need, and follow-up. Queries after evaluation were scored from poor (less than 50%) to excellent (80% or more). The grades assigned were either poor (if less than 50%), fair (if between 50-60%), good (if between 60-70%), very good (if between 70-80%), or excellent (if 80% or more). The minimum acceptable grade was considered to be 60%.

Results
A total of 126 poison information queries were obtained in eight categories. 115 queries were received from physicians, 5 from paediatricians, and one each from a psychiatrist, anaesthetist, oral surgeon, and forensic expert, while two calls were from patients themselves. Quality control tests showed that the majority of the poison information (n=103) provided, rated excellent (with a rating of 80% or more); 21 rated good (with a rating of 70-80%), while 2 were good (with a rating of 60-70%).

Conclusion
This study shows that a clinical pharmacy department with essential resources can efficiently provide poison information services.

Pattern of Poisoning in a Rural Tertiary Hospital in Central India

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Poisoning constitutes an important entity among the seriously ill cases admitted in every hospital. This paper deals with the study of different types of poisoning cases admitted to the Kasturba Hospital of Mahatma Gandhi Institute of Medical Sciences, Sewagram in Maharastra State.

Body fluid samples such as blood and gastric aspirate from victims of poisoning admitted to Kasturba Hospital were analyzed in the Clinical Toxicology Laboratory of the Department of Forensic Medicine. The total number of cases analyzed from the inception of the toxicology laboratory, i.e., Jan 1997, right up to Sept 2005 was 1784.

The different types of poisons were classified according to their group, brand name, chemical name, and the pattern of poisoning was studied as per the patient parameters such as age, sex, and area [rural/urban].

Analysis of poisons was done in the Toxicology Laboratory by chemical methods, high performance liquid chromatography [HPLC], and spectrophotometry. Out of the total poisons detected in this study, the commonest group detected was pesticides, followed by volatile agents and pharmaceutical drugs.

A Retrospective Study of 50 Poisoning Cases in GSL Medical College, Rajahmundry, Andhra Pradesh, and their Outcome

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This is a retrospective study of 50 poisoning cases from the vicinity of Rajahmundry, admitted to G.S.L Medical College, East Godavari District during the period 2003-2005 with particular reference to the commonest and least type of suicidal poisons and their outcome, male and female ratio, different age groups, dose administration, availability of poison, place of intake, identification of poison, cause of intake, dying declaration, diagnostic techniques used, treatment, and survival rate all presented in a tabulated form.

*Identification of Target Population for Community Based Awareness Programs on Prevention of Pesticide Poisoning by Spot Mapping

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Introduction

Geographical variations in the pattern of poisoning is well known. About 63% of global deaths from self harm occur in the Asia Pacific, more commonly in rural areas because of easy access to highly toxic pesticides. The case fatality for self poisoning in rural Asia is 10-20%, and 89% of pesticide deaths occur in farming households. Community based awareness programs are essential to prevent poisoning and can be initiated only if the geographical location of poisonings is established. Spot mapping technique can be a highly useful tool to identify prime areas for education programs.

Aim

To target the community population who require awareness and training programs on the prevention of pesticide poisoning.

Methodology

This was a retrospective observational study conducted in Kasturba Hospital, Manipal, in which the geography of all the pesticide poisoning cases admitted from 2000-04 was collected. Spot mapping was done in the Udupi district map to identify the areas most prone for poisoning.

Results

Out of the 528 pesticide poisoning cases observed over 5 years, 205 victims (38.8%) were in the 20-29 age group, 104 victims (19.6%) in the 30-39, and 74 victims (14.1%) in the 10-19 age group. Organophosphate and carbamate pesticides had the highest prevalence with 434 cases (82%). The overall mortality was 144 deaths with 110 deaths (76.3%) due to pesticides, out of which 96 deaths (66.67%) were due to organophosphates and carbamates. The distribution was highest among housewives and those without occupation, viz., 170 cases (33.3%). The areas with high poisoning frequency were then identified by spot mapping

Conclusion

These findings support the need of education programs regarding pesticide poisoning, and spot mapping can be a useful tool to identify prime areas for intervention.

* Winner of Best Paper Award in the category of General Toxicology

A Case Study of Carbon Monoxide Poisoning

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Inhalation of carbon monoxide, a colourless and odourless non-irritating gas formed during incomplete oxidation of carbonaceous materials in furnaces, internal combustion engines, etc., at a concentration of 50-60% can cause mental confusion and movement disorder resembling acute alcoholism. Death can occur if the concentration exceeds 70%.

A nineteen year old boy was found dead in a closed room in suspicious circumstances in an abnormal posture, suggestive of violence before death. The colour of the postmortem staining, as also that of the tissues and organs, histopathological findings of lungs, etc., and blood examination findings revealed it to be a case of carbon monoxide poisoning. Scene examination was conducted and the source of carbon monoxide located, thereby resolving the case.

Carbon monoxide poisoning can result in a condition akin to alcohol intoxication, and can lead to disturbance of the scene owing to incoordinated and disoriented movements of the victim. He may not call for help as there is mental confusion. As he inhales more and more of the gas, there is progressive toxicity and eventual death. A careful postmortem examination together with histopathological investigation, scene examination, and chemical analysis can resolve the issue, which may otherwise be mistaken for death due to violence.

Corrosive Acid Poisoning - A Case Report

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A young male aged 22 years was admitted to JSS Medical College Hospital, Mysore on 03rd September 2004 at 10 PM with a history of consumption of toilet cleaner (phenol), with complaints of severe burning sensation in the abdomen and episodes of vomiting of blood (6-8 times). He was treated for the same for 4 days but succumbed on 07th September at 10.45 PM. The body was shifted to the mortuary under the department of Forensic Medicine. Subsequent postmortem examination revealed features of nitric acid poisoning.

Bamboo Shoot: Is it Nutritious or is it Poisonous?

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A 14 year old female with a history of ingestion of bamboo shoot extract (juice) was admitted to the Medicine department in J.S.S. Medical College Hospital, Mysore. She exhibited features of sudden onset of convulsions, vomiting, respiratory distress, and loss of consciousness. Symptomatic treatment was given along with supportive measures, following laboratory investigations. Later the patient recovered in the same hospital.

Autopsy Resolves an Apparent Assault

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This is a case report of a young woman who allegedly died due to multiple blunt traumatic lesions as a result of assault. Postmortem examination revealed that death was due to consumption of poison.

Toxicodynamics of Phosphamidon an Organophosphorus Compound with Reference to Dopaminergic System

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A remarkable increase in the utilization of organophosphorus compounds (OPC) has created considerable concern over their toxic effects comprising motor, behavioural and autonomic symptoms, which are related to the inhibition of the enzyme acetylcholinesterase (AChE) in the cortex, striatum, hippocampus, hypothalamus and brainstem regions of the central nervous system. This was considered to be the main mode of action for a long time. Later it was found that OPC also exhibits non-cholinergic mechanisms involving noradrenaline (NA), dopamine (DA) and 5-hydroxytyptamine (5-HT). Some of the symptoms of OPC intoxication such as tremors have been related to the dopaminergic system, and therefore therapy must take into account not only cholinergic manifestations, but also other neurotransmitter alterations.

With these in mind, the present study was undertaken to find out the effects of phosphamidon (PM), an OPC administered alone and after pretreatment with domaminergic agonist drug bromocriptine, and an anticholinergic drug, on the DA levels in four discrete areas of the brain of rat, and to identify the correlation with toxic symptoms.

It was found that PM caused significant reduction of DA levels in the different areas of brain with resultant autonomic effects. Both DA level and autonomic effects of PM were reversed by atropine, and while bromocriptine did not influence the depressed DA level owing to its protective action, it may be combined with atropine for possible enhanced effects.

Death due to *Cerbera thevetia* Poisoning

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Cerbera thevetia is a well known cardiotoxic plant, various parts of which are used for committing suicide in rural areas of India.

A 27 year old female was admitted to the hospital with a history of consumption of *Cerbera thevetia* seeds. She was conscious at the time of admission but was irritable. Gastric lavage yielded a yellow coloured fluid. There was abatement of symptoms for a short time before symptoms such as chest pain, dyspnoea and palpitations increased in intensity, and she was shifted to the ICU. In spite of aggressive treatment she died, and an autopsy was subsequently carried out.

The postmortem findings and chemical analysis conducted on the viscera are discussed.

Toxicological Analysis of Blood and Viscera by Forensic Science Laboratory and Interpretation of the Results

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Blood and selected viscera are generally collected during medicolegal autopsies in suspected cases of poisoning. This is sent to the Forensic Science Laboratory (FSL) of the area, and based on the analysis conducted, final opinion as to the cause of death is furnished. Many medical officers and junior forensic experts have no idea, or possess only vague knowledge as to how the toxicologists in the FSL proceed to conduct various tests on the samples sent, and issue the report. This paper illustrates the procedure of conducting various tests adopted at FSL Bangalore, Karnataka, and highlights some points to be observed by doctors while performing the autopsy, and subsequently interpreting the report of the FSL for arriving at the cause of death, particularly when the chemical analysis is negative.

Haematological and Biochemical Studies in *Clarias gariepinus* Exposed to Monocrotophos and Dichlorvos

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Acute toxicity of the organophophorus pesticides monocrotophos and dichlorvos was assessed using static toxicity method. Haematology and biochemical studies were carried out in fishes exposed to sublethal concentrations (10, 20% of 96h LC_{50} value) of these pesticides, and sampled at 2, 4, 6, and 8 days with parallel untreated control. The results of haematological studies showed decrease in RBC, WBC, Hb and PCV values. Thrombocyte values increased in both the pesticides. Biochemical studies revealed hyperglycemia and hypoprotienemia as duration increased. The serum transaminases (SGOT & SGPT) and alkaline phosphatase values also increased with duration. The results were analysed using 't'-test.

Kerosene Poisoning

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This retrospective analysis describes the impact of kerosene poisoning in children in a tertiary care hospital in Bangalore.

Objective

To investigate the demographics, incidence, and symptomatology of kerosene poisoning admitted in our hospital.

Methods

The medical records of all children admitted for hydrocarbon poisoning from 1990 to 2004 (10 years) were reviewed retrospectively. About 104 cases of kerosene poisoning were admitted to St. John's Medical Medical College Hospital-Bangalore. The age, sex, weight, location of incident, type of incident (accidental/suicidal/homicidal), amount consumed, time of consumption, length of hospital stay, clinical symptoms at the time of admission, chest x ray findings, final outcome and cause of death were studied.

Results

97% of the victims were <2 years, 98% of the cases happened at home, average hospital stay was 3 days, 90% of the patients were dispositioned from the emergency medicine department to the department of PICU. If the amount of consumption was above 50 ml the probability of chemical pneumonia was higher. 98% of poisoning was accidental. Most patients consumed kerosene in the daytime. The cause of the incident in most cases was due to storage of kerosene in soft drink bottles. 25% of cases were referred from other hospitals. 10% of patients received gastric lavage in the other hospital and 5 % of the patients were given first aid in their home by induction of vomiting using salt water. The major symptoms during admission were vomiting, diarrhoea, tachypnoea, anaemia, seizures, cough, and cyanosis. 60% of chest x rays showed infiltration. Mortality rate was 3.5%.

Bioremediation of Sugar Mill Effluent

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Environmental toxic impact of sugar mill effluent discharged from Mohanur sugar mill located in Namakkal district, Tamil Nadu was investigated. Physico-chemical characteristics of the effluent were analyzed. It was brown in colour, acidic with high organic load as indicated by high BOD, COD and TDS. Laboratory scale in biodegradation of sugar mill effluent using white rot fungus *Phanerochaete chrysosporium* is reported for the first time. Results revealed highly successful efficiency of treatment shown in reduction of BOD, COD, TDS and lignin by over 50-90% there by satisfying CPCB (1995) standard for effluent discharge.

An Epidemiological Pattern of Acute Poisoning in South India

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Background
Ninety-nine percent of fatal poisonings occur in developing countries. It is important to know the magnitude and pattern of acute poisonings, in a particular area as it is important for early diagnosis and treatment and also for preventive measures. This is the second reported study from the southern part of India, and the first reported study regarding the trends of poisoning in Bangalore.

Objectives
To determine the incidence of hospital admissions following acute poisoning.

Study design
Retrospective observational study

Study duration
2000-2005(5 Years)

Study Population
2337 patients diagnosed as acute poisoning and admitted for treatment in our Emergency Medicine Department.

Methods
Medical records and medicolegal records of all poison cases were studied for age, sex, seasonal variation, annual variation, types of poisons, disposition, outcome, unusual poisonings, cause of death and hospital stay. All patients were grouped into four categories based on the nature of substance consumed: (1) Medical compounds (2) Plants (3) Household substances (4) Agriculture substances (5) Industrial chemicals (6) Unknown substances.

Study setting
Department of Emergency Medicine, St. John's Medical College Hospital, Bangalore

Results
Will be discussed during the presentation.

A Paediatric Case of Acute Myocarditis Following Scorpion Envenomation

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Occasionally, insect stings producing systemic complications are the reason for admission to paediatric intensive care. We report an interesting case of scorpion sting in a 3-year-old girl. The child who was stung presented with signs of peripheral circulatory collapse. ECG and ECHO done were suggestive of myocarditis. Prompt intensive supportive care led to the child's complete recovery.

Randomized Open Labeled Trial of Intermediate Vs Continuous Pralidoxime in the Treatment of Acute Organophosphate Poisoning

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Background

Treatment of organophosphate (OP) poisoning consists of intravenous atropine and oximes. The effectiveness of oxime therapy in OP is still a matter of debate.

Objective

To compare the effects of an intermittent dose of pralidoxime chloride versus continuous infusion on the duration of muscle weakness, duration of ventilatory support, intermediate syndrome, duration of hospital stay and eventual outcome.

Materials & Methods

Inclusion criteria: Unequivocal evidence of OP poisoning, container, Age ≥ 18 years

Exclusion criteria: Inconsistent history of consumption of poison, co-morbid condition like chronic respiratory/ cardiac/neurological Illness

Study Design

52 adult patients presenting to our hospital with a diagnosis of OP poisoning and requiring emergency intensive care were entered in the trial. Patients were randomised using an alternative randomization technique to receive a loading dose of PAM of 1 gm in 100 ml of normal saline over half an hour, followed by a continuous IV infusion of PAM (7mg /kg/hour) for a period of 96 hours from the time of ingestion; (or) Loading dose of PAM of 1 gm in 100 ml of normal saline over half an hour, followed by intermittent PAM injection (1 gm in 100ml normal saline over 1 hour, every 8 hrs) for a period of 96 hours from the time of ingestion. If they are on ventilator or have significant neuromuscular weakness, PAM was to be continued in the same dosage to a maximum of seven days from the time of ingestion. The outcome measures analyzed were mortality, duration of hospital and ICU stays, duration of ventilation, and development of intermediate syndrome.

Study Duration

2003 to 2005.

Results

Will be discussed during the presentation.

Acute Renal Failure following Honeybee Stings: A Geriatric Case Report

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A geriatric case of acute renal failure following honey bee stings is reported here with a review of literature. Although such cases have been periodically reported in literature, the incidence is low.

Hepatoprotective and Antioxidant Activity of the Marine Red Algae *Acanthophora spicifera* on CCl_4 Induced Liver Toxicity in Rats

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In view of the continued screening of seaweeds of the Gulf of Mannar for biological activity *Acanthophora spicifera*, one of the most common species along the Mandapam coast was identified to study the hepatoprotective effect and antioxidant effect in CCl_4 intoxicated male albino rats. Liver damage was induced in rats by injecting CCl_4. The effect of the seaweed extract (ethanolic) at different doses was determined by comparing with the controls. The algal extract at a dose of 200 mg/kg b.w orally was found to exhibit a significant decrease in the level of SGOT, SGPT and LDH as compared to those of the CCl_4 induced liver damaged controls. The level of lipid peroxidation was also decreased in the 200 mg/kg extract treated rats. The antioxidant status of the extract treated rats showed tremendous increase in the levels of the antioxidant enzymes SOD, catalase and glutathione peroxidase. The biological activity was related to the phyto-constituents such as flavonoids, vitamin – A, E, C, present in the algae.

How to Set up a Low-Cost Analytical Toxicology Laboratory

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An Analytical Toxicology Laboratory is an integral part of a Poison Control Centre (PCC), and is mainly concerned with the qualitative or quantitative estimation/ identification of poisons or potentially toxic substances in both biological as well as non-biological samples. Amrita Institute of Medical Sciences has a WHO-accredited PCC with a fully functional analytical toxicology laboratory. The analytical toxicology laboratory of AIMS has the capacity to identify most of the commonly encountered poisons, and that too with accuracy and speed. The highlights of the PCC along with the statistics of the analytical toxicology laboratory are detailed in the poster.

Hospitals in India have always shied away from the very thought of an Analytical Toxicology facility, owing to the uncertainties and potential costs that could be incurred in establishing it. But in reality, an analytical toxicology laboratory cab be begun as a very simple and low-cost set up which utilizes down-to-earth technology to the fullest. “Speed and Accuracy” should be the watchword for every analytical toxicology laboratory, and being a service/patient oriented facility “economy” should also be kept in mind while offering the services. A fundamental biochemical laboratory with basic instruments or facilities such as TLC, UV-Visible Spectrophotometer, etc., should be adequate, though equipment like HPLC/GC-MS would be very helpful in increasing the speed and accuracy of the results. Adequately qualified, trained and committed staff is also indispensable for efficient running of the laboratory. The finer details of the establishment of an analytical toxicology laboratory are dealt with in detail, outlining the inception and growth of the Analytical Toxicology Laboratory, AIMS, as a paradigm.

Protective Role of *Ocimum sanctum L.* Infusion against Norethynodrel Induced Genotoxic Damage in Cultured Human Peripheral Blood Lymphocytes

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Synthetic progestins have widespread use in medicine but their side effects are often debatable. Norethynodrel is a synthetic progestin used either as single entity drug or in combination with estrogen such as ethinylestradiol in oral contraceptives. It induces chromosomal aberrations (Cas) sister chromatid exchanges (SCEs) and inhibits lymphocytes proliferation in the presence of metabolic activation (S9 mix) in cultured human peripheral blood lymphocytes. The genotoxic effects of steroids can be reduced by the use of various antioxidiants and natural plant products. Aqueous extract of *Ocimum sanctum L*. leaves have been used for the treatment of a variety of conditions since ancient times. Pharmacological evidence shows that Sacred Basil possesses immunomodulating, hepatoprotective, chemopreventive, anticancer, antioxidant, antimutagenic and antigenotoxic properties.

The infusion concentration of $1.075x10^{-4}$, $2.127x10^{-4}$ and $3.15x10^{-4}$ g/ml of culture medium were tested against 60 µg/ml of norethynodrel separately in the presence of S9 mix. Aqueous plant infusion results in the reduction of the genotoxic damage by norethynodrel. Our study on other synthetic progestins such as ethynodioldiacetate, lynerstrenol and medro-xyprogesterone acetate showed genotoxic effects only in the presence of S9 mix. Estrogens such as estradiol-17β and ethinylestradiol undergo aromatic hydroxylation by cytochrome P450 and generate various forms of quinines. Quinones, via redox cycling in the presence of NADP generates reactives oxygen species (ROS). Pharmacologically active compounds of *O.sanctum L*. like eugenol, rosmarinic acid and epigenin are excellent antioxidants. Flavonoids orientin and vicenin showed a protective effect against radiation induced genotoxic damage in cultured human lymphocytes by scavenging free radicals. The infusion of medicinal plants can modulate DNA damage when associated with other substances.