

Briefing Report on Medical Research by Sambhavna Trust

Introduction

As highlighted in the Deed of the Sambhavna Trust, "The main object of the Trust is the welfare of the survivors of the Bhopal Gas Disaster through medical care, research, health education and information dissemination." In fulfilment of its primary objective the Sambhavna Trust has been actively engaged in epidemiological and clinical research for the benefit of the gas victims and those exposed to contaminated ground water. The unprecedented magnitude and nature of toxic exposure, unexpected long term consequences and the lack of knowledge on appropriate therapeutic interventions make medical research in Bhopal imperative both for generating knowledge and for developing treatment methodologies. Despite the involvement of ICMR in 24 medical research projects for 10 years, there are vast knowledge gaps that require to be filled for a better understanding of the consequences, their management and for possible precautionary measures to be taken to minimize some of the long term health problems. Prior to the disaster there was only one research paper on the health impact of Methyl Iso Cyanate (MIC) exposure published in a peer reviewed international journal and it is rather unfortunate that there is still a paucity of such publications. Accessibility to findings of medical research continues to remain an issue of concern and due to lack of coordination between medical research and medical treatment the benefits of medical research have not reached the survivors with chronic illnesses. Despite financial and other resource constraints, Sambhavna Trust has carried out epidemiological and clinical studies following ethical norms and published some of them in international peer reviewed journals. The clinic run by the Trust has the space, trained scientific personnel, experience of carrying research in community as well as in the clinic and access to expertise and institutions.

Table 1: Research Carried out by Sambhavna

S No.	Title	Year	Population	Parameters	Finding	Outcome
1.	Effects of Yoga practices for respiratory disorders related to the Union Carbide Gas Disaster in 1984.	1999	30 persons with respiratory disorders following gas exposure	Spirometry values Pulse & Respiratory rates.	Yoga can lead to sustained improvement in lung functions of exposed persons with chronic respiratory problems.	Yoga instructors trained by Sambhavna Trust are providing care in two government hospitals
2.	Effect of parental exposure on children.	2001	141 children of exposed and unexposed parents	Anthropomorphic values.	Male children of exposed parents are thinner, lighter and have smaller cranial circumference compared to male children of unexposed parents.	Publication in Journal of the American Medical Association
3.	Long term follow up of persons exposed to toxic gas in-utero.	2006	141 children of exposed and unexposed parents	Anthropomorphic values. Tanner stage	Early stunting among male children of exposed parents is followed by a catch-up growth.	Publication in Journal of the Federation of American Societies for Experimental Biology

4.	Anemia prevalence in communities exposed and unexposed to contaminated ground water.	2007	300 adults exposed and 303 adults unexposed to contaminated ground water.	Haemoglobin levels.	Average Hb concentration of men exposed to contaminated groundwater was shown to be almost 1g/dL lower than that of men with access to clean water.	Follow up study required with appropriate sample size.
5.	Comparative efficacy of Yoga therapy in treatment of Dysmenorrhoea of women exposed to contaminated ground water.	2008	60 women with Dysmenorrhoea	Menstrual pattern Severity of pain	Yoga was found to be more effective than pain killers.	Yoga therapy included in protocol for treatment of Dysmenorrhoea.
6.	An epidemiological cross-sectional study of the effects of exposure to toxic gases and contaminated water on the	2010	110, 000 persons in four exposure categories	1. Physical Growth and Mental and Social development milestones for 0 to 5 years old.children, 2. Mid arm circumference, Cranial circumference, Leg length, sitting height, standing height and weight of 2 to 15 years	Preliminary findings indicate that in comparison to unexposed families, gas and contaminated ground water exposed families have significantly larger number of people with TB, paralysis and	To be sent for publication after final data analysis is over.

	Bhopal population.			old children, 3. Mortalities between January 1, 2006 till survey date for all four populations.4. Mortalities between December 3, 1984 and December 31, 1989 for gas exposed population, 5. Reproductive history of all women, 6. Diagnosed Cancers, 7. Diagnosed Tuberculosis, 8. Diagnosed Paralysis and 9. Congenital abnormalities	cancers. Lung, abdominal, throat and oral cancers are significantly higher in gas exposed and gas plus contaminated ground water exposed group. Gas exposed women were found to have suffered significantly larger number of abortions in comparison to unexposed women. Compared to an unexposed population, significantly larger number of children born to gas exposed and contaminated ground water exposed parents had birth defects.	
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Table 2: Summary of Ongoing Research Work in Sambhavna Trust Clinic in May 2018

S No.	Title	Objective	Methodology	Participants	Current Status	Completion date	Follow up
1.	Comparison of status of health and healthcare of gas affected people with respect to unexposed.	To identify priorities of and improvements required in health care of the gas affected population.	Administration of a field tested questionnaire on a sub sample of the cohort for gas exposed and unexposed individuals.	Tasneem Zaidi, Santosh Kshatriya, Farhat Jahan, Hariom Vishwakarma, Shailendra Chourasia	Data collection over. Analysis of data is ongoing.	May 2018	Report to be forwarded to all agencies involved in health care of gas victims. Hindi report to be distributed among the study population.
2.	Assessment of effectiveness of Ayurvedic treatment in Autoimmune disorders.	Standardize Ayurvedic interventions for Rheumatoid arthritis and Psoriasis	Assessment of effectiveness through Follow up questions and investigations pre and post treatment.	Dr. Mrityunjay Mali	Data collection over.	May 2018	Findings to be published in Ayurveda journal.
3.	Establishment of community based system for	To establish a self sustaining system of	Bring together interested members of a community and	Tasneem Zaidi, Santosh Kshatriya, Farhat Jahan,	Focused group discussion among	Pilot phase to be completed by	Expanding area of work and periodic monitoring of

	surveillance of Births and Deaths.	birth and death surveillance that is under the control of the local population.	provide information, training and standard formats for recording of information.	Hariom Vishwakarma, Shailendra Chourasia	interested members started in two communities.	December 2018.	the work of community based groups.
4.	Development of herbal preservatives for water based herbal preparations.	To develop safer herbal alternatives to potentially toxic synthetic preservatives such as Sodium benzoate.	Periodic microbiological examination of Areetha (Sapindas Mukorossi) solution following addition of different extracts of Lantana camara.	Vishwamohan Dwivedi, Prachi Gupta	Effects of different extracts of Lantana camara on Areetha aqueous solution is being studied for presence of fungi at periodic intervals.	December 2018.	Will apply for patent on Herbal preservative. Start routine addition in Areetha solution produced at the Clinic. Share technology with Sambhav Enterprises.

5.	Use of microbes captured from forest for increasing productivity of medicinal plants.	To improve soil quality and plant productivity.	Microbes harvested from nearby forests are grown and sprayed on soil. Conditions created for survival and growth of microbes in soil. Productivity is compared with those on untreated matched soil.	Manmohan Yadav, Ratna Soni, Mukesh Kushwaha, Prachi Gupta	Microbe population increased through adding jaggery. Sprayed on test patch. Plant lengths and girths measured. Data collection ongoing.	December 2018.	In case of positive outcome, a booklet describing the work of harvesting microorganisms and using them for increasing productivity in organic farming will be produced and distributed.
6.	Development of herbal mosquito repellants.	Development of safer alternatives to synthetic mosquito repellants.	Hand roll and dry dough prepared with powdered mixtures of Van Tulsi (<i>Ocimum americanum</i>), Neem (<i>Azadirchta Indica</i>) and Vasa (<i>Adhatoda vasica</i>) and a binder.	Chandrakanta, Nandkishore, Vishwamohan	Production and testing of incense sticks is ongoing. Developing machinery for mass production of incense sticks.	March 2019	Large scale production for distribution outside the clinic.

7.	Assessment of effectiveness of herbal alternatives to antibiotics in non-healing wounds.	To standardize herbal interventions against resistant microbes.	Monitor condition of wound treated with herbs and corroborate with culture/sensitivity of resistant organism with regard to herb extract.	Dr. Mrityunjay Mali, Ratna Soni, Prachi Gupta	Herbs to be used have been identified. Preparations made to recruit willing subjects.	December 2019	Development of treatment protocol for non-healing wounds. Publication of findings in research journal.
8.	Standardizing herbal alternatives to Fluconazole for treatment of Fluconazole resistant candida albicans.	To standardize herbal interventions against resistant fungi.	Monitor condition with treatment with herbs and corroborate with culture/sensitivity of resistant fungi with regard to herb extract.	Dr. Satiwan Mordia, Dr. Usha Arya, Dr. Mrityunjay Mali, Prachi Gupta	Herbs to be used have been identified. Preparations made to recruit willing subjects.	December 2019	Development of treatment protocol for Fluconazole resistant candida albicans. Publication of findings in research journal.

Publication of Research

Following papers based on research work carried out by Sambhavna staff and others are appended in their entirety.

1. Catch-up growth in males affected by the Union Carbide disaster of 1984 in Bhopal, India

Daya R Varma, Ritesh Pal, Diana Katgara, Satinath Sarangi, Tasneem Zaidi, Steven Holleran, Rajashekhar Ramakrishnan and Shree Mulay

Federation of American Societies for Experimental Biology

Volume 22, Issue 1 Supplement 01 Mar 2008

2. Effects of exposure of parents to toxic gases in Bhopal on the offspring

S. Sarangi Mtech, T. Zaidi, R.K. Pal, D. Katgara, V.G. Gadag, S. Mulay, D.R. Varma

American Journal of Industrial Medicine

Vol. 53, Issue 8, August 2010, pp. 836 - 841

3. Methyl Isocyanate Exposure and Growth Patterns of Adolescents in Bhopal.

Nishant Ranjan, Satinath Sarangi, V T Padmanabhan, Steve Holleran, Rajshekhar Ramakrishnan, Daya R Varma

Journal of American Medical Association

Vol. 290, No. 14, October 8, 2013 pp 1856-1857