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Statistical methods. Describe statistical methods in enough detail to enable a knowledgeable reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals). Avoid relying solely on statistical hypothesis testing (such as the use of p-values) which fails to convey important quantitative information. Discuss the eligibility of experimental subjects. Give details about randomisation. Describe the methods for and success of any blinding of observations. Report complications of treatment. Give numbers of observations. Report losses to observation (such as drop-outs from a clinical trial). References for the design of the study and statistical methods should be to standard works when possible (with pages stated) rather than to papers in which the designs or methods were originally reported. Specify any general-use computer programs used. Put a general description of methods in the Methods section. When data are summarised in the Results section, specify the statistical methods used to analyse them. Restrict tables and figures to those needed to explain the argument of the paper and to assess its support. Use graphs as an alternative to tables with many entries; do not duplicate data in graphs and tables. Avoid non-technical uses of technical terms in statistics, such as "random" (which implies a randomising device), "normal," "significant", "correlations" and "sample". Define statistical terms, abbreviations, and most symbols. The symbol \pm should not be used. Use "mean (SD)" instead.

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2. Davis JM, Rosenfeld WN. Chronic lung disease. In: Avery GB, Fletcher MA, MacDonald MG, eds. *Neonatology; Pathophysiology and Management of the Newborn*. Philadelphia, PA: Lippincott, 1999; 29.

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Parenting an Adolescent

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Adolescence is viewed as a period of transformation and reorganization in family relationships. Prominent among these changes is the shift that occurs from unilateral authority exercised by parents over their children to mutual authority in which adolescents share in the decision-making process and exercise increasing amounts of personal jurisdiction over their own behavior. This shifting and renegotiation of authority and control, along with a host of correlated biological, social, cognitive, and self-definitional/personal identity transitions that occur during this period, results in transformations in the pattern of family interactions and is associated with the emergence and escalation of conflict between adolescents and their parents.

Recently, it has been discovered that adolescence is a time of neuronal pruning-when the brain gets rid of entire neuronal networks it no longer uses. Some neuro-psychologists blame this process for the poor impulse control and immature decision-making in a formally reliable child that is often seen during the teen years. In many ways the teen years can be great for parents, as they see the results of their parenting efforts during earlier years coming together and their son or daughter developing into an adult ready to take on the challenges of living and thriving in our modern world.

At the same time however this is also a dangerous time for teenagers, as parental

influence often begins to diminish and is replaced by that of their peers and others outside of the family environment. It is also a time when excitement seems to lurk around every corner and there is a tremendous temptation for teenagers to try to run before they have finished learning how to walk.

It can be difficult to control the activities of a teenager and this is a time when late night parties, drinking and drugs will open up a whole new and exciting world. Girlfriends, or boyfriends, and the whole confusing arena of love, sex and sexuality will open up and adolescents often find themselves under considerable psychological pressure. This is a time in their lives when they will often find themselves troubled by the direction in which their lives are going. This is the time they will need considerable advice and guidance, but they may also be less than willing to accept the help.

Teen parenting is challenging for parents, but it is to be remembered that the teen years are often the most difficult part of a child's life. *No longer a child, yet definitely not an adult, a teen is stuck in the middle.* Compound this with an uncertain sense of self (because that self is changing), the angst and embarrassment that often accompanies puberty, and adolescent crushes. Mix in raging hormones adolescents have a recipe for mood swings, suddenly outbursts, defensiveness, defiance and withdrawal.

" Unlike the child-oriented 50's and 60's where one consistent adult was available to patiently

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guide self-discovery to the consequences of actions, today's society is fast-paced with a multitude of adults playing into the child's life each week. Without clear limits, children get confused, feel insecure, and can make poor choices".

Kimberly Kopko

However parenting teens and preteens has never been easy. It may seem harder today in this too-much-information-and-everything-else age, but the basic principles haven't changed. It's a balancing act: allowing more freedom while maintaining limits that will hopefully help them live long enough to become their own persons.

When a teen and a parent argue, it does not mean that something is wrong with the relationship. It means that the participants are on different wavelengths in wishes, values, attitudes or beliefs. Conflict is never easy, but it is more prevalent in households where there are teenagers attempting to establish individualism and a parent trying it in different way.

There are four different types of parenting styles that are commonly identified by an expert by the name of Diana Baumrind in the parenting field. These styles are known as *authoritarian parenting, permissive parenting, neglectful parenting, and authoritative parenting*. There are important differences between each of these styles, and there is one style that is significantly better than the other three. In order to understand which type is the best parenting style; however, we need to review all of them first.

I. The authoritarian style of parenting: This style is characterized by high expectations of compliance and conformity to parental rules and directions. The problem with authoritarian parenting is that the parental rules and directions often change when the parent feels like changing them, so the child never truly knows what is expected. The situation could be

described as unfair and threatening.

Many children raised by authoritarian parents live in a constant state of fear. They tend to display less self-confidence and are withdrawn socially. Some children might also rebel by openly defying the parents by leaving home at a younger age, partaking in drugs, alcohol, and sexual behavior at a much younger age, dating or marrying a partner whom they know their parents would disapprove of, and often might be estranged from their parents during adulthood.

II. The permissive parenting: This style is typically characterized by a warm, loving relationship between parent and child, but is flawed by low expectations of behavior. In other words, the permissive parent is usually afraid to make demands on the child much less hold them to any standard. This type of parent simply wants the child to like them at the end of the day and will do anything the child requests to do.

Children raised by overly permissive parents tend to suffer from a lack of focus, immaturity and problems with emotional regulation. The children can not control their impulses and do not accept the responsibility for their own actions. When in trouble, the child will simply blame someone else even if it was their own fault. They tend to live and remain close to where they grew up, still dependent, in early adulthood.

III. Neglectful parenting: is another type of parenting styles. This style is best described as a step beyond permissive parenting. The neglectful parent may provide food and shelter, but is generally emotionally uninvolved in the child's life. A good example of this would be parents who never ask their child questions about their day, their friends, or their education.

A neglected child may have serious issues going on outside the home, but the neglectful parent is never aware of them until something potentially tragic occurs. Many times children

will grow up feeling resentment against their parents for being neglectful and often might be estranged from them into adulthood.

IV. The authoritative / Democratic parenting is last of the types of parenting styles, and definitely the one that is considered ideal. This type of parent holds high expectations of the child's behavior while allowing the child to talk about those expectations. Parental rules and directions imposed on the child are fair and expressed clearly. The authoritative parent teaches the child about cause and effect, decision-making and self-sufficiency. They do this in a warm and loving manner. They often, "try to catch their children being good" and reinforcing the good behavior, rather than focusing on the bad.

Authoritative parents raise children who are successful, articulate, happy with themselves, and generous with others. This results in them being liked and respected by their peers and allows them to be generally well-rounded adults. Parents should strive to raise their children with the authoritative style of parenting.

A parent-child relationship which is very stressful or troubled during the preadolescent years can be a strong signal that professional help may be needed. Parents investment of time and energy in the child's early years can prevent small problems of childhood from becoming larger problems of adolescence.

Take Care and Remember

"Too often we under estimate the power of a touch, a smile, a kind word, a listening ear, an honest compliment, or the smallest act of caring, all of which have the potential to turn a life around."

-Leo Buscaglia

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A Study of Peak Expiratory Flow Rate (PEFR) in 6-12 years Age Group in Relation to Height in Eastern India

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ABSTRACT

Background: Bronchial Asthma is a common cause of mortality and morbidity in the developing world like India. **Objective:** The purpose of the present study was to establish a nomogram for PEFR in 6-12 yrs age group in relation to height in Eastern India, a first of its kind study for Eastern India. **Setting:** 1003 randomly selected healthy school children in Kolkata. **Study Design:** Prospective cross sectional study. **Material and Methods:** Mini Wright peak flow meter was used to measure PEFR in resting condition and standing position. The best value of three attempts was recorded and compared to height, weight, sex and age separately. Multiple regression analysis was used to determine the influence of various variables. **Results:** Height ranged from 95 cm to 155 cm and PEFR ranged from 115 L/min to 335 L/min irrespective of sex. Mean PEFR was 241.5 L/min in all sexes whereas the median, 25th percentile and 75th percentile values were 244.1 L/min, 186 L/min and 290 L/min respectively. PEFR values increased in a linear pattern with increase in height in both sexes. Using multiple regression analysis we can estimate the PEFR values with height alone in both sexes with more than 95% accuracy. **Conclusion:** PEFR values depend on height, weight, age and sex, the former being the most important parameter.

KEY WORDS: Peak Expiratory Flow Rate (PEFR), School children

INTRODUCTION

Asthma is the most common lung disease affecting persons of all ages and is a major health problem¹. Boys (14% vs 10% girls) are more affected and 80% of all asthmatics report disease onset prior to 6 yr of age². It has been recommended that pulmonary function tests i.e. PEFR and spirometry should be a part of the diagnostic evaluation and treatment of asthma. Peak flow meters are small, portable, convenient and inexpensive devices that can be easily used in outpatient departments to diagnose assess severity and evaluate response to therapy. Spirometry provides additional information

about the degree of small airway obstruction and help in differentiating obstructive from restrictive disorders. Ethnic differences including genetic and environmental factors have been shown to account for differences in PEFR^{3,4}, so each ethnic group or region should ideally have its own reference values for better evaluation and comparison. No such reference values are present for Eastern India and this is an attempt to create PEFR reference values in relation to height for children in the 6-12 yr age group for this region.

MATERIALS AND METHODS

This study was carried out in 1003 school children of age group 6-12 years in Kolkata for a

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period of twelve months from May 2008-May 2009. The subjects of the study were chosen at random irrespective of the socio economic status, sex and religion so that it can reflect an overall picture of the PEFr status of children in this city. Children fulfilling the criteria as suggested by Taussig et al⁵ were included in the study. These are :

- i) absence of any chronic lung disease
- ii) no history of acute respiratory tract infection in the preceding 3 weeks,
- iii) no major respiratory tract disease or thoracic surgery in the past,
- iv) no systemic disease influencing the respiratory system, and
- v) non-smoker.

A detailed examination, including anthropometric measurements (weight, height, chest circumference) was carried out and any child weighing less than 80% of 50th centile of NCHS standards or with a height of less than 2SD of NCHS standards was not included in the study. A Mini Wright flow meter (Clement Clarke International, U.K.) was used to measure the PEFr in the standing position. After demonstration, all children were first tested using low range pediatric peak flow meter (range 0-350 L/min) and if the PEFr exceeded the upper limit they were then tested on the standard (adult) flow meter (range 60-800 L/min). The best of three values were compared against standard reference values. Those students having lower peak value were subjected to inhalation therapy using a spacer of 250 ml volume and salbutamol inhaler. Those with an improvement of 15% or more were considered asthmatic and excluded from the study. Various statistical analysis of data by Graph Pad software was done to create reference values of PEFr in relation to height, age and sex (male and female) separately. P values were obtained to predict significance and multiple regression analysis was used to predict PEFr value from the height alone

and also from height, age and sex simultaneously.

RESULTS AND ANALYSIS

1003 children were enrolled in the study, 468 (46.8%) were boys and 535 (53.5%) were girls. The result of mean PEFr values in relation was expressed in the Table 1.

From the graph (Fig.1) it was obvious that the mean PEFr values correlated well with height. PEFr values increase in more or less in linear fashion with respect to height in cm in different age groups. It was seen that the mean PEFr was 241.5 L/min in all sexes whereas the median, 25th percentile and 75th percentile values were 244.1 L/min, 186 L/min and 290 L/min respectively. Here standard deviation (SD) is 59.7. Standard Error (SE) is 7.7, whereas the lower and upper 95% Confidence Intervals (CI) were 226.1 and 256.8 respectively.

For male children PEFr ranged from 150 L/min to 350 L/min while Mean was 262.7 L/min, Median was 262 L/min and SD was 67.67. For female children PEFr ranged from 110 L/min to 310 L/min, while Mean was 224.17 L/min, Median was 228.6 L/min and SD was 58.63.

For the better benefit of comparison of the PEFr values in different age groups, the total no. of children has been divided into three age groups-6-8 yrs, 9-10 yrs and 11-12 yrs. It was evident that the PEFr values were increased with age and male children of all age groups had higher PEFr values than females (Table 2). Multiple regression analysis was used to model the PEFr values from height, weight and age (Table 3). The model was found to be strong with this model explaining 95% of the variation of data.

DISCUSSION

According to our study height ranged from 95 to 155 cm, PEFr ranged from 115 L/min to 335 L/min with mean PEFr value of 241.5 L/

Table 1. Result of mean PEFR in relation to Height

Height in cm	n	PEFR L/min	Height in cm	n	PEFR L/min	Height in cm	n	PEFR L/min	Height in cm	n	PEFR L/min
95	33	115	110	24	183	126	17	244	141	8	290
96	27	145	112	19	186	127	15	261	142	10	296
97	29	165	113	25	202	128	13	253	143	12	297
98	31	185	114	23	203	129	12	263	144	14	301
99	22	170	115	21	216	130	14	268	145	9	302
100	15	175	116	19	215	131	16	263	146	8	320
101	27	185	117	17	202	132	18	270	147	9	320
102	19	186	118	15	225	133	18	287	148	15	322
103	28	180	119	14	237	134	12	285	149	13	321
104	27	183	120	16	227	135	18	288	150	11	325
105	23	182	121	18	238	136	11	281	151	9	328
106	17	185	122	20	221	137	13	278	152	7	330
107	19	181	123	11	227	138	9	302	153	5	330
108	18	180	124	21	241	139	7	296	154	4	335
109	22	182	125	19	250	140	5	300	155	6	330

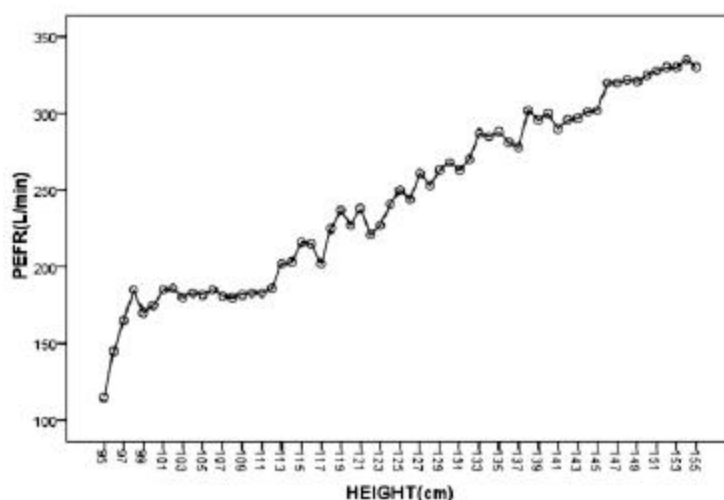


Fig 1. Graphic representation of PEFR values (L/min) in relation to height

Table 2. Distribution of mean PEFR in different age groups of male and female

Age in years	Male			Female			p-value
	No	Mean (L/min)	SD (L/min)	No	Mean (L/min)	SD (L/min)	
6-8	243	235.7	56.13	325	205.42	49.31	<0.0001
9-10	157	302.07	42.96	107	250.28	48.18	<0.0001
11-12	68	318.09	50.62	103	268.93	54.88	<0.0001

Table 3. Multiple regression analysis of mean PEFR

a)	PEFR(male) = 3.4654 HEIGHT (cm) - 170.3831
	PEFR(female) = 2.8390 X HEIGHT(cm) - 130.7042
b)	PEFR(male) = 2.2268 X HEIGHT(cm) + 11.0164 X AGE(yrs) + 0.7979 X WT(kg)
	PEFR(female) = 1.8294 X HEIGHT(cm) + 7.1081 X AGE(yrs) + 0.8073 X WT(kg)

Table 4. Comparative values of mean PEFR in different studies compared to the present study.

Height in cm	Paramesh ⁶ 2002 n=5477	Sanz ⁷ et al 1990		Wall ⁸ et al 1982		Present study 2009 n=1003		
	Common value	male	female	male	female	Common value	male	female
120	200	252	237	240	228	227	246	211
140	300	352	341	327	319	300	314	265
155	375					330	350	310
160	400	452	445	427	418		384*	324*

* Calculated from multiple regression analysis

Height in cm	Godfrey ⁹ et al 1970 n=383		Malik ¹⁰ et al 1981 n=473		Kashyap ¹¹ et al 1992 n=237		Swaminathan ¹² et al 1992 n=345	
	male	female	male	female	male	female	male	female
120	212	211	222	216	202	175	205	193
140	318	317	320	314	304	263	286	272
160	423	422	415	412	405	352	368	350

min and median was 244.1 L/min. PEFR values in both male and female children increase with height and male children have higher PEFR values than female children. Using multiple regression analysis we can calculate the expected PEFR only from height alone or from height, weight and age simultaneously. When using the former, the expected PEFR is calculated >95% accuracy.

When we compare our study with other Indian as well as Western studies, we find the maximum height obtained in their studies to be more than our maximum of 155 cm. To compare the PEFR values of the children with height of 160 cm with other studies,⁶⁻¹² we took the help of multiple regression analysis which showed the expected PEFR in our study at 160 cm height to be 384 L/min and 324 L/min for male and female respectively.

On comparing our data with previously published Western values, the children of Eastern

India showed lower PEFR values as compared to Sanz et al⁷ (1990) on Caucasian children and Wall et al⁸ (1982) on North American Indian children. The probable reason could be the larger body size and lung volumes of Western and Caucasian children. The lower PEFR values could be an effect of lower lung volume due to a smaller chest size as has been reported previously in adults¹³.

Godfrey et al⁹ (1970) in U.K. interestingly showed lower PEFR values in comparison to studies by Sanz et al and Wall et al. This difference becomes marked if we compare recent Western values with previous ones as there has been a gradual increase in body size and presumably lung volumes as well over the decades in that population¹².

When we compare our study with other Indian studies, the results are fairly comparable with

the studies of Swaminathan et al¹² and Paramesh⁶ reflecting the South Indian children and as well as in the study of Kashyap et al¹¹ on Himalayan children. Further in comparison with North Indian children of Punjab (studies by Malik et al^{10,14}), children of Eastern India (our study) and South India (study by Swaminathan et al and Paramesh H) showed lesser PEFr values with respect to height. The probable explanation would be the larger body size and lung volumes of North Indian children in comparison to East and South Indian children

When we compare the PEFr values between the sexes the studies by Malik et al¹⁰, Kashyap et al¹¹, Swaminathan et al¹², Sanz et al⁷ as well as ours showed significant differences between the sexes, male children showing higher values. But Paramesh⁶ and Godfrey et al⁹ failed to show any difference. The probable reason for lower PEFr values in females is the less lung volume for the same height in comparison to males.

Swaminathan et al¹² also observed that the PEFr values were gradually increased with age which is comparable to our study. Our children showed higher PEFr values in all age groups as compared to Swaminathan et al, the probable reason being the ethnic variation between the two study groups.

Multiple regression analysis was used in our study to predict the PEFr values. Our study found that PEFr equation can be used to predict the PEFr value fairly accurately with height being the best predictor variable. Paramesh⁶ had also observed that height is the best predictor of assessing PEFr. Our model showed strong degree of accuracy (95% level). The model for PEFr differs between male and female. This model needs to be verified among different ethnic groups in our country

CONCLUSION

The regular measurement of PEFr in asthmatic children is of great value to monitor

their clinical status, management and follow-up. The purpose of this study was to create reference values of PEFr for children of Eastern India living at sea level in a tropical climate.

We sincerely hope that more such studies will be done in future on a larger scale to generate more accurate reference values and that similar data would also be available from other parts of the country.

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CONTRIBUTORS

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Assessment of awareness on Safe Injection Practices among different types of Health care Providers at Burdwan Medical College

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ABSTRACT

Objective: To assess the awareness of different types of health care providers on safe injection practices. **Materials & methods:** Under MIC programme in 2006, awareness of 544 health care providers consisting of 98 doctors, 149 nurses, 145 medical, nursing & paramedical students & 152 health workers was assessed using a self-administered questionnaire. Data were analyzed to obtain proportion of different responses. **Results:** 16.32% doctors opined to prescribe injection for quick relief of patients. Most frequently perceived reason for patients' preference to injection was quick relief in 59.68% doctors, 67.11% of nurses, 45.69% of paramedical workers and 68.96% of students. Importance of proper injection technique was not realized by 66% nurses and 82% of paramedical workers. About 50% of doctors and nurses & 65% of paramedical workers and students could not apprehend reuse of equipments after improper disposal of injection related waste. **Conclusion:** There is a considerable gap in knowledge about different aspects of safe injection practices among different types of health care providers.

KEY WORDS: Safe injection practices, MIC Programme, Health Care Providers

INTRODUCTION

The magnitude of unsafe injection practice is enormous in India amounting to about 63% (AIPI Study¹). Such unsafe injection practices increase the risk of transmitting blood borne infections like Hepatitis B & C, HIV and other risks of infection / abscess formation / local reactions to the recipients.

In India about 300 crore injections are given annually of which 53.3% injections are considered unnecessary, 83.3% injection are for curative purpose (AIPI Study¹). Such a high load of unnecessary injections also increase the infections and environmentally dangerous waste posing a constant threat to the community. The

components of safe injection practice are linked with rational prescription of injections, safe injection techniques, safe disposal of injection related waste and finally proper community awareness.

In view of the above, Model Injection Centre Program (MICP) has come up in 25 medical colleges in the country (Training Manual on MIC²). In this program training of injection prescribers as well as providers in principles and practices of injection safety and insistence for rational use of injections and safe disposal of injection related waste is one of the most important objectives. On this background the present study was conducted to assess the awareness of different types of health care providers on safe injection practices.

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MATERIALS & METHODS

The study is a qualitative one. Data were collected with the help of a pre-designed and pre-tested close ended questionnaire in a training program for the health care providers for opinion survey, level. As the primary data was one basically of attribute nature and did not involve any quantitative variable it is characterized as a quantitative study. The categorical data were coded and analyzed through Excel Package and the responses were classified in six components of knowledge assessment as shown in results.

In IPEN STUDY (2002-03) it was noticed that 63% of injections given annually in India were administered in an unsafe way, which has prompted to a training program entitled Assessment of Communication Needs in Injection Practices by the IndiaCLEN society. Burdwan Medical College being one of the partners medical college of this program was entrusted with the training program under MIC and the current study is the resultant effect of the program for the period of 2006-2008.

RESULTS

Regarding reasons for preference to prescribe injection, majority of doctors (57.14%) stated, when patients cannot take medication orally or due to side effects of oral medication. According to them, other reasons are cases of serious

disease, unconscious patients (43.87%), non-availability of specific oral preparation (41.83%), when patients do not improve with oral medication (15.3%) and (13.26%) for immunization. About 29.59% doctors would prescribe injection to give quick relief and also due to better compliance to injection (16.32%). Nurses, paramedical workers and students expressed that injections were to be prescribed preferably for immunization (Table 1).

Most frequently perceived reason was quick relief by all groups of participants namely 59.18% doctors, 67.11% nurses, 45.69% paramedical workers and 68.96% students. Intolerance to oral drug was mentioned by 14.28% doctors, 28.43% nurses, 17.21% paramedical workers and 31.72% of students. Mental satisfaction of patients was stated by 26% doctors, 14% nurses, 18% paramedics and 10% students. Better compliance to injection was the idea of patients as stated by 13% doctors, 15% nurses and 14% students (Table 1).

Though majority of participants of all groups mentioned about HIV/AIDS and Hepatitis B/C and others blood-borne infections, yet about 15% doctors, 25% of nurses and paramedical workers and 6% of students were unaware of HIV/AIDS. Moreover about 14% of doctors, 36% nurses, 39% paramedical workers and 5% students could not mention Hepatitis B/C /other blood borne infections. Students were most aware of these diseases. Moreover all groups had knowledge

Table 1. Reasons for patients' preference for injection, despite availability of equally active oral medications, as perceived by the participants

Type of Participants	Quick relief	Better compliance	Intolerance to oral drug	Mental satisfaction	Ignorance
Doctor	58(59.18)	13(13.26)	14(14.28)	25(25.51)	15(15.3)
Nurse	100(67.11)	22(14.76)	37(24.83)	21(14.09)	17(11.4)
Paramedical Worker	69(45.69)	13(8.6)	26(17.21)	27(17.88)	26(17.21)
Student	100(68.96)	21(14.48)	46(31.72)	15(10.34)	10(6.89)

**Figures in the parentheses indicate percentage.*

Table 2. Knowledge of participants about probable complications due to re-use of plastic syringe / needle or use of unboiled glass syringe for injection

Type of Participants	HIV/ AIDS	HBV, HCV & other Blood Borne infections	Abscess	Local pain / swelling	Other disease
Doctor	84(85.71)	85(86.73)	45(45.91)	21(21.42)	39(39.79)
Nurse	113(75.83)	95(63.75)	81(54.36)	23(15.43)	57(38.25)
Paramedical Worker	112(74.17)	92(60.92)	66(43.7)	9(5.96)	66(43.7)
Student	136(93.79)	137(94.48)	53(36.55)	37(25.51)	81(55.86)

*Figures in the parentheses indicate percentage.

Table 3. Knowledge of participants about characteristics of safe injection

Type of Participants	Use of sterile glass syringe / Disposable syringe / Needle	Proper Technique	Cause no reaction	Observe sterile precaution	Proper disposal after injection	Prevent Blood Borne infection	No harm to injection giver	Cleaning of site	Right drug & dosage
Doctor	58(59.18)	42(42.85)	26(26.53)	27(27.55)	19(19.38)	14(14.28)	13(13.26)	13(13.26)	14(14.28)
Nurse	104(69.79)	51(34.22)	19(12.75)	58(38.92)	18(12.08)	9(6.04)	4(2.68)	21(14.09)	18(12.08)
Paramedical Worker	109(72.18)	28(18.54)	11(7.28)	22(14.56)	11(7.28)	3(1.98)	1(0.66)	11(7.28)	9(5.96)
Student	68(46.89)	69(47.58)	62(42.75)	41(28.27)	16(11.03)	24(16.55)	18(12.41)	9(6.2)	26(17.93)

*Figures in the parentheses indicate percentage.

that other disease like tuberculosis, leprosy etc may spread by unsafe injection as 39.79% doctors, 38.25% nurses, 43.7% paramedical workers and 55.86% of students mentioned this (Table 2).

Regarding knowledge of participants about characteristics of Safe Injection Practice (Table 3), paramedical workers stressed mostly on use of sterile glass syringe or disposable syringe and needle (72.18%) followed by nurses (68.79%) but around 40% doctors and 55% students were not aware of that. Proper technique was not mentioned by around 66% nurses and around 82% paramedical workers. 42.85% doctors and 47.58% students only mentioned it, where as observation of sterile technique like washing hand, wearing gloves was stressed mostly by nurses (38.92%) followed by 28.27% students, 27.55% doctors and

only 14.56% of paramedical workers. Need for proper disposal after injection was unknown to about 80% doctors, 90% nurses and students and 93% paramedical workers. Safe injection also saves injection givers - such idea was almost nonexistent among paramedical workers and nurses while 13.26% doctors and 12.41% students knew it. Around 85% of doctors and nurses and 93% of paramedical workers and students did not have proper knowledge of cleaning the site of injection before injection as a component of safe injection practice. Some participants from all groups had inadequate knowledge that right drug and dose means safe injection.

Doctors' stated mostly proper technique (54.08%) followed by causing no reaction (35.71%). Nurses stressed more on use of sterile syringe / needle (52.34%) followed by proper

technique (39.59%) Paramedical workers had the presumption that patients meant use of sterile syringe / needle (48.34%) followed by proper technique (27.15%) while students mostly stated proper technique (74.48%) followed by causing no reaction (62.75%) as the concept of patients about safe injection (Table 4).

Chance of transmission of disease by improper disposal after injection was not known by 35% doctors, 25% nurses, 40% paramedical workers and about 20% of students. About 50% doctors and nurses and 65% students and paramedical workers did not mention about chance of reuse. Chance of injury to others was mentioned mostly by nurses 58.38% followed by students 55.86% and almost 38% by doctors and paramedical workers. Environmental pollution was pointed out by 54.48% students, 44.96% nurses, 43.87% doctors and 35.04% of paramedical workers (Table 5).

DISCUSSION

The study revealed that the knowledge of health care provider was not adequate. Preference for prescribing injection was wrongly attributed to give quick relief and better compliance by some doctors, which is not a proved truth. Regarding reasons of patients' preference for injection mostly perceived research has quick relief of patients as mentioned by all groups of participants. This may lead to unnecessary use of injection. There is gap of knowledge regarding reasons for patients' preference for injection.

Participants' from all groups had wrong idea that disease like tuberculosis, leprosy etc. may spread through unsafe injection where as some of them were unaware of chance of HIV/AIDS, Hepatitis B and C and other blood borne infection. Studies in other countries have diverse results. 58.3% of health workers knew the

Table 4. Knowledge of participants on patients' concept about safe injection

Type of Participants	Proper technique	Causes no reaction	Use of glass syringe / Disposable syringe / needle	Prevent new disease	Completely cures disease
Doctor	53(54.08)	35(35.71)	27(27.55)	14(14.28)	13(13.26)
Nurse	59(39.59)	21(14.09)	78(52.34)	2(1.34)	12(8.05)
Paramedical Worker	41(27.15)	18(11.92)	73(48.34)	8(5.29)	7(4.63)
Student	108(74.48)	91(62.75)	26(17.93)	13(8.96)	22(15.17)

**Figures in the parentheses indicate percentage.*

Table 5. Knowledge of participants about probable problems caused by improper disposal of syringe and needle after injection

Type of Participants	Chance of spreading disease	Chance of reuse	Chance injury to other people	Environmental Pollution
Doctor	64(65.3)	46(46.93)	38(38.77)	43(43.87)
Nurse	113(75.83)	74(49.66)	87(58.38)	67(44.96)
Paramedical Worker	92(60.92)	52(34.43)	58(38.41)	53(35.09)
Student	120(82.75)	56(38.62)	81(55.86)	79(54.48)

**Figures in the parentheses indicate percentage.*

disease transmissible by needle stick infection at Nigeria while 44.7% mentioned other diseases like tuberculosis³, chance of transmission of HIV, HCV and HBV through contaminated syringe and needle was known to 95%, 59% and 89% of professional employees in China⁴. In Cambodia 20% prescribers and injection providers have the idea that HBV, HCV and HIV were frequent through unsafe injection practices⁵. However a study in North India showed that the level of knowledge about HIV & HBV transmission by unsafe injection was satisfactory among prescribers but inadequate among providers. But HCV was known to very few of them⁶. Proper technique of injection was not mentioned as a characteristic of safe injection by injection providers like nurses and health workers. Observation of sterile techniques during injection was not mentioned by majority of them.

Twenty percent health care workers in Nigeria had correct understanding of safe injection, which is less than the present study. In the context of probable problems caused by improper disposal of waste after injection, majority did not apprehend about chance of reuse of equipments.

So the present study has highlighted that there is a considerable gap of knowledge on different aspects of safe injection practice among all category of health care providers. The poor knowledge of safe disposal of injection related waste still poses a threat to the community in the matter of emergence of blood borne diseases and growing environmental pollutions. The gap could be minimized only by providing adequate training to all injection givers and prescribers. Thus the Model Injection Centre Program (MICP) is a felt need program. More rapidly the messages could be spread to the health care stake holders, the more quickly the dreadful blood borne diseases could be prevented averting many lives and resulting to less costs, sorrows and sufferings. All category

of participants highly apprised of usefulness, sustenance and more coverage of the program throughout the country.

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Free Radical Induced Oxidative Stress in Neonates

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INTRODUCTION

Oxidative stress (OS) represents an imbalance between the production and manifestation of reactive oxygen species (ROS) and a biological system's ability to readily detoxify the reactive intermediates or to repair the resulting damage. Disturbances in the normal redox state of tissues can cause toxic effects through the production of peroxides and free radicals (FR) that damage all components of the cell, including proteins, lipids and DNA.

Oxidative stress occurs as a consequence of imbalance between the formation of oxygen free radicals and inactivation of these species by antioxidant defense system¹. Oxygen free radicals are incriminated in the causation of several neonatal diseases including bronchopulmonary dysplasia (BPD), retinopathy of prematurity (ROP), persistent ductus arteriosus, necrotizing enterocolitis, intracranial hemorrhage and hypoxic ischemic encephalopathy^{2,3}.

Background of Chemical Bonding

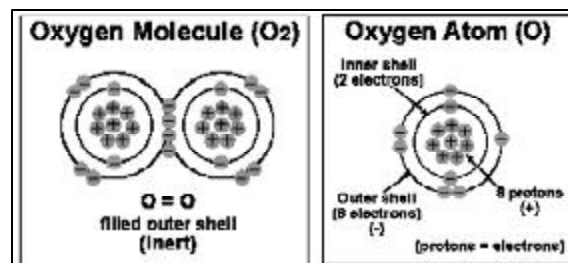
The human body is composed of many different types of cells. Cells are composed of many different types of molecules. Molecules consist of one or more atoms of one or more elements joined by chemical bonds.

Atoms consist of a nucleus (consisting of neutrons and protons) and electrons. The most important structural feature of an atom for

determining its chemical behavior is the number of electrons in its outer shell. A substance, whose electrons in the outer shell is full, tends not to enter in chemical reactions (an inert substance). Because atoms seek to reach a state of maximum stability, an atom will try to fill its outer shell by:

- Gaining or losing electrons to either fill or empty its outer shell
- Sharing its electrons by bonding together with other atoms in order to complete its outer shell

Atoms often complete their outer shells by sharing electrons with other atoms. By sharing electrons, the atoms are bound together and satisfy the conditions of maximum stability for the molecule.



What are free radicals?

Normally, bonds do not split in a way that leaves a molecule with an odd, unpaired electron. But when weak bonds split, free radicals are formed. Free radicals are very unstable and react quickly with other compounds, trying to capture the needed

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electron to gain stability. Generally, free radicals attack the nearest stable molecule, "stealing" its electron. When the "attacked" molecule loses its electron, it becomes a free radical itself, beginning a chain reaction. Once the process is started, it can cascade, finally resulting in the disruption of a living cell.

Some free radicals arise normally during metabolism. Sometimes the body's immune system's cells purposefully create them to neutralize viruses and bacteria. However, environmental factors such as pollution, radiation, cigarette smoke and herbicides can also spawn free radicals.

A free radical is an atom or molecule capable of independent (usually brief) existence that contains one or more unpaired electrons in their outermost orbit⁴. Free radicals mainly superoxide anion (O_2^-) are incriminated in the pathogenesis of tissue injury in many human diseases. They produce cellular injury by lipid peroxidation, enzyme inactivation, damage of DNA and degradation of structural proteins. The free radical theory implies that antioxidants such as superoxide dismutase (SOD), catalase (CAT), glutathione (GSH), vitamin A, vitamin C and vitamin E prevents free radicals from oxidising sensitive biological molecules or reduce formation of free radicals⁵. However; occasionally biological processes can result in an increased generation of free radicals, which can exceed the capacity of the cell's antioxidant defense systems and result in oxidative damage to proteins, lipids and DNA, with possible cell dysfunction or death⁶.

What is Reactive oxygen species?

Reactive oxygen species (ROS) are chemically-reactive molecules containing oxygen. Examples include oxygen ions and peroxides. Reactive oxygen species are highly reactive due to the presence of unpaired valence shell electrons. ROS form as a natural byproduct

of the normal metabolism of oxygen and have important roles in cell signaling. However, during times of environmental stress (e.g., UV or heat exposure), ROS levels can increase dramatically⁷. This may result in significant damage to cell structures. This cumulates into a situation known as oxidative stress. ROS are also generated by exogenous sources such as ionizing radiation.

In general, harmful effects of reactive oxygen species on the cell are most often:

1. Damage of DNA
2. Oxidations of polyunsaturated fatty acids in lipids (lipid peroxidation)
3. Oxidations of amino acids in proteins
4. Oxidatively inactivate specific enzymes by oxidation of co-factors

Antioxidants

Antioxidants are thought to protect the body against the destructive effects of free radicals. Antioxidants neutralize free radicals by donating one of their own electrons, ending the electron -"stealing" reaction. Antioxidants terminate these chain reactions by being oxidized themselves, so antioxidants are often reducing agents such as thiols, ascorbic acid or polyphenols⁸.

The antioxidant nutrients themselves do not become free radicals by donating an electron because they are stable in either form. They act as scavengers, helping to prevent cell and tissue damage that could lead to cellular damage and diseases. Although oxidation reactions are crucial for life, they can also be damaging; hence, the body has evolved multiple defense mechanisms against free radicals by production of major antioxidant enzymes - superoxide dismutase (SOD), catalase (CAT), glutathione (GSH), vitamins (vitamins A, E and C) and iron-associated antioxidants (ceruloplasmin, apotransferrin)⁵. Low levels of antioxidants, or inhibition of the antioxidant enzymes, cause oxidative stress and may damage or kill cells.

Under normal circumstances, there is a critical balance between prooxidant and antioxidant forces. Of the many biological targets of oxidative stress, lipids are the most involved class of biomolecules. Lipid oxidation gives rise to a number of secondary products. Malon-di-aldehyde (MDA) is the principal and most studied product of polyunsaturated fatty acid peroxidation¹.

Susceptibility of the newborns and effects of oxidative injury

Newborns and particularly preterm infants are at high risk of oxidative stress and they are very susceptible to free radical oxidative damage. Indeed, there is evidence of an imbalance between antioxidant and oxidant-generating systems which causes oxidative damage. In preterm infants antioxidant defense systems have not fully matured because endogenous and passively acquired exogenous antioxidant defense systems do not accelerate in maturation until late in the third trimester. Premature infants are probably developmentally prepared for extrauterine life in an oxygen-rich environment and exhibit a unique sensitivity to oxidant injury. Diseases associated with premature infants, including bronchopulmonary dysplasia, periventricular leukomalacia, intraventricular hemorrhage, retinopathy of prematurity, and necrotizing enterocolitis, have been linked to free radical-mediated cell and tissue injury^{2,3}.

It is apparent that the intrauterine period of life is a very important period from a nutritional standpoint⁹. The normal fetal growth is a result of complex interaction among the three components of maternal-placental-fetal unit. Nutritional status of the mother is the most important maternal factor leading to intrauterine growth retardation⁹. Malnutrition involves deficiency of not only the macronutrients i.e. fats, proteins, carbohydrates

but also results in subphysiological concentration of most micronutrients. Many antioxidant defense systems depend on micronutrients or are micronutrients themselves. Proteins provide amino acids for synthesis of antioxidant defense enzymes, reduced glutathione (GSH) and albumin (as sacrificial antioxidant protein). Therefore, one would expect a gross derangement of the antioxidant defense mechanisms in malnutrition. Small for gestational age (SGA) babies born at term to undernourished mothers provide a unique opportunity to have an insight into the mechanism and implications of the fetal growth retardation, secondary to intrauterine malnutrition. No study is available on the role of oxidative stress in term neonates born out of intrauterine growth retardation as a consequence of maternal malnutrition.

Effects on brain:

The brain may be especially at risk of free radical-mediated injury because neuronal membranes are rich in polyunsaturated fatty acids and because the human newborn has a relative deficiency of brain superoxide dismutase and glutathione peroxidase. The brain of the term fetus is at higher risk of oxidative stress than that of the preterm fetus, as a consequence of its higher concentration of polyunsaturated fatty acids and the maturity of the N-methyl-D-aspartate receptor system at term. Excess free iron and deficient iron-binding and metabolizing capacity are additional features favouring oxidant stress in premature infants. Free radicals may be generated by different mechanisms, such as ischemia-reperfusion, neutrophil and macrophage activation, Fenton chemistry, endothelial cell xanthine oxidase, free fatty acid and prostaglandin metabolism and hypoxia. Reactive oxidant production by these different mechanisms contributes in a piecemeal manner to the pathogenesis of perinatal brain injury¹⁰.

Effects on lung:

One of the proposed contributory mechanisms in the development of BPD in extremely low birth weight (ELBW) infants is lung damage from oxygen free radicals. Preterm infants have inadequate antioxidant defenses and may not be able to induce antioxidant enzymes in response to oxidative stress¹¹. Exogenously administered superoxide dismutase (SOD), an important intracellular enzyme that dismutates the superoxide radical into hydrogen peroxide, has been studied as a potential therapy to prevent oxygen toxicity in the ELBW infant. Although SOD is apparently safe, available data do not support its use for the prevention of BPD in the ELBW infant outside clinical trials.

Effects on gut:

Necrotizing enterocolitis (NEC) is the most commonly occurring gastrointestinal emergency in preterm infants. Despite the lack of a direct causal relationship of hypoxia and NEC, regulation of vascular bed flow differs in preterm infants and in adults, and these unique differences may make the preterm intestine more vulnerable to hypoxia during the period of reperfusion that typically follows a period of ischemia. During reperfusion, oxygen free radicals are generated; these free radicals can cause the tissue damage that is typically seen in reperfusion injuries. These free radicals result from the enzymatic breakdown of hypoxanthine that accumulates during ischemia and from activated neutrophils that adhere to the gut microvasculature after ischemic injury.

Effects on eye:

Retinopathy of prematurity (ROP) is a neovascularizing disease that, in its most severe form, can lead to retinal detachment and subsequent blindness. The most common causes of ROP are premature birth and low birth weight¹². Incidence and severity of ROP increase

with decreasing gestation. The injury to retinal blood vessels by free radicals has been hypothesized to be the initiating insult in infants in whom development of ROP is related to severe illness¹⁴. In the premature infant, exposure of the incompletely-vascularized retina to elevated concentrations of oxygen can lead to retinopathy of prematurity, which in its worst forms can result in blindness.

CONCLUSION

Oxidative stress presents numerous opportunities for tissue injury through formation of reactive oxygen/nitrogen species. Oxidative stress can occur early in pregnancy and continue until the first few days of life. In clinical practice, early markers of oxidative stress indicate that prenatal prophylactic use of antioxidants could help to prevent or at least reduce oxidative stress related diseases in fetuses and newborns.

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2010 Year Long Program of West Bengal Academy of Pediatrics

23rd, 24th April	9th National Midterm CME of Infectious Diseases Chapter, Royal Bengal Room, Salt Lake City Centre
1st May	Rheumatology CME, Apollo Gleneagles Hospital
May 2011	Summer CME, IAP Hooghly Branch
28th, 29th May	PALS Course in ICH
19th June	2nd National Respiratory CME
18th,19th June	Annual CME at Apollo Gleneagles Hospital
3rd July	Monsoon CME - Howrah IAP
26th July	ORS Day Celebration at ICH, Kolkata
2nd - 7th August	World Breastfeeding Week Celebration
17th September	Seashore CME, and National Conference PEDICON 2013 Meeting and EB Meeting
20th November	Cardiology CME. R N Tagore Institute of Cardiac Sciences
10th, 11th December	WB Pedicon 2011

Measures to Provide Effective Phototherapy for Treatment of Neonatal Jaundice

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INTRODUCTION

Phototherapy can be said to be discovered by a nurse Jean Ward at Roche ford Hospital, Essex, England in 1956, although the findings were published in 1958 by Cremer and colleagues in England.¹ She liked to expose the newborn infants in her ward to the sun, and observed that jaundiced skin exposed to sunlight appeared less yellow than skin which had been covered by clothing or diapers. Although sunlight provides sufficient irradiance to provide phototherapy, the practical difficulties involved in safely exposing a naked newborn to the sun either inside or outside (and avoiding sunburn) preclude the use of sunlight as a reliable therapeutic tool, and it is therefore not recommended.²

From then on till now phototherapy has remained the mainstay of treatment of hyperbilirubinemia and has been found to be used in up to 10% of babies in some units.³

However, the phototherapy units vary widely, the types of lamps used differ, the amount of skin exposed to phototherapy often depends on other clinical issues, and the intensity of light depends on lamp power and the distance from the skin. With standard phototherapy systems, a decrease of 6% to 20% of the initial bilirubin level can be expected in the first 24 hours⁴.

Factors controlling the efficacy of phototherapy⁵

(a) *Spectrum of light emitted:*

Blue-green spectrum is most effective. At these wavelengths (425-475 nm), light penetrates skin well and is absorbed maximally by bilirubin. Special blue tubes or Light Emitting Diode (LED) light source with output in blue-green spectrum are used for intensive phototherapy.

(b) *Spectral irradiance (irradiance in certain wavelength band) delivered to surface of infant:*

Measured in microwatt per square cm per nanometre by an instrument called a radiometer. Phototherapy lamps can be brought as close as possible to the baby so as to increase the irradiance. Special blue tubes 10-15 cm above the infant will produce an irradiance of at least 35 $\mu\text{W}/\text{cm}^2$ per nm.

(c) *Spectral power (average spectral irradiance across surface area):*

Increase in surface area of exposure increases efficacy of phototherapy. Double surface phototherapy may be more effective than single surface phototherapy.

(d) *Cause of jaundice:*

Phototherapy is likely to be less effective if jaundice is due to hemolysis or if cholestasis is present. When hemolysis is present, phototherapy is to be started at lower Total Serum Bilirubin (TSB) levels and intensive

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phototherapy is used. Failure of phototherapy suggests that hemolysis is the cause of jaundice.

(e) *TSB level at start of phototherapy:*

The higher the TSB, the more rapid the decline in TSB with phototherapy. Intensive phototherapy should be used for higher TSB levels. Anticipate a more rapid decrease in TSB when TSB >20 mg/dL (342 $\mu\text{mol/L}$).

What is Intensive Phototherapy?

Intensive phototherapy implies the use of high levels of irradiance in the 430 to 490 nm band (usually 30 $\mu\text{W/cm}^2$ per nm or higher) delivered to as much of the infant's surface area as possible.⁵

The dose response relationship of phototherapy

Conventional phototherapy involves exposing a maximal area of skin to an irradiance of 6 to 12 $\mu\text{W/cm}^2/\text{nm}$.² High-intensity phototherapy was first described in 1977 (Tan, 1977).² The rationale for high-intensity phototherapy is the demonstration of a dose-response relationship to bilirubin degradation until a saturation dose is reached at about 40 $\mu\text{W/cm}^2/\text{nm}$ of appropriate light. The use of high-intensity phototherapy has been advocated by investigators who have documented more effective reduction of TSB levels with no long-term complications. Although certain phototherapy reactions reach their peak at relatively low levels of irradiance (6 to 9 $\mu\text{W/cm}^2/\text{nm}$), the production of lumirubin is directly proportional to the energy output on the skin.⁶ High-intensity phototherapy results in greater amounts of lumirubin among the photoisomers. Because the conversion of bilirubin to lumirubin and other excretable photoproducts is partly irreversible and follows first-order kinetics, there may not be a saturation point, so we do not know the maximum effective dose of phototherapy.⁵

Light sources: a newer technology is not always a better technology

The light sources available:

- Daylight/cool white light.
- Blue Compact Fluorescent Lamp (CFL) / special blue fluorescent tube.
- Tungsten halogen lamp.
- High intensity gallium nitride LED.
- Fiber-optic device.

Daylight/cool white light and blue CFL/ special blue fluorescent tubes:

The most effective light sources currently commercially available for phototherapy are those that use special blue fluorescent tubes or a specially designed light emitting diode light.⁵ The special blue tubes are labelled as TL52/20W (Phillips). It is important to note that special blue tubes provide much greater irradiance than regular blue tubes. In devices with blue bulbs, the length of each wave achieves from 425 to 475nm, with irradiance equal to 22 $\mu\text{W/cm}^2/\text{nm}$ (composed of 7 blue bulbs). These devices present irradiance two to three times higher than that observed in devices with white bulbs.⁷

Carvalo DM et al found that highly efficient phototherapy may be delivered with daylight fluorescent lamps placed in very close proximity to the patient. Thus, lack of access to expensive imported special blue lamps does not preclude delivery of effective phototherapy in developing countries.⁹

Tungsten halogen light bulbs:

Halogen light bulbs are spot lights and are preferably used in premature infants due to the size of the light source. They provide a circular pool of light where the energy is highest in the centre and drops off significantly towards the edges of the light circle. They usually have irradiance above that emitted by conventional devices, in the range of 25 to 30 $\mu\text{W/cm}^2/\text{nm}$. They have filters for infrared and ultraviolet radiation.

However, distribution of the irradiance is irregular, unlike the conventional, and gives a very high peak in the centre. Usually bulbs have to be changed when irradiance is below 10 $\mu\text{W}/\text{cm}^2/\text{nm}$.⁷

High intensity gallium nitride LEDs:

High-intensity gallium nitride light-emitting diodes (LEDs) had been proposed as a potential light source for delivering phototherapy. LEDs deliver high-intensity narrowband light with minimal heat generation, are lightweight and portable, and can be used in a variety of applications. In a preliminary clinical trial, blue LED phototherapy was as efficacious as conventional fluorescent phototherapy.² However an open label multicenter randomized controlled trial in India has found that LED and CFL phototherapy units were equally efficacious in the management of non-hemolytic hyperbilirubinemia in healthy term and late-preterm neonates.⁸

Fiber-optic devices:

Fiber-optic systems deliver light from a high-intensity lamp to a Fiber-optic blanket. Most of these devices deliver enough output in the blue-green region of the visible spectrum to be effective for standard phototherapy use. In a recent Cochrane review¹⁰ it was found that fiber-optic phototherapy was more effective at lowering TSB than no treatment but less effective than conventional phototherapy. However they concluded that Fiber-optic phototherapy has a place in the management of neonatal hyperbilirubinemia and it is probably a safe alternative to conventional phototherapy in term infants with physiological jaundice.

Distance of baby from lamps

The distance of the light source from the infant has a dramatic effect on the spectral irradiance, and this effect is most significant when special blue tubes are used. To take

advantage of this effect, the fluorescent tubes should be placed as close to the infant as possible. To do this, the infant should be in a bassinet, not an incubator, because the top of the incubator prevents the light from being brought sufficiently close to the infant. In a bassinet, it is possible to bring the fluorescent tubes within approximately 10 cm of the infant. Naked term infants do not become overheated under these lights. It is important to note, however, that the halogen spot phototherapy lamps cannot be positioned closer to the infant than recommended by the manufacturers without incurring the risk of a burn.

Surface area

This can be increased in the following ways:-

- Double surface phototherapy by using fluorescence tubes both above and below the baby.
- Placing Fiber-optic pads below the infant and phototherapy lamps above can increase the exposed surface area. However, one disadvantage of Fiber-optic pads is that they cover a relatively small surface area so that 2 or 3 pads may be needed.
- Additional surface-area exposure can be achieved by lining the sides of the bassinet with aluminium foil or a white cloth.

Djokomuljanto, *et al*¹¹ have reported significant increase in irradiance and shortening in the duration of phototherapy on using slings. Djokomuljanto, *et al* used locally produced under pads (used to protect the sheets of the cots against faecal or urinary soiling) as slings and others used white bed sheets around cots. Studies are needed to recommend use of low-cost white reflecting materials in routine use.

Intermittent vs. continuous phototherapy

Intermittent phototherapy has been found to have less rate of reduction of bilirubin and poorer

overall efficacy in comparison to continuous phototherapy. Therefore, all phototherapy should be continuous and breaks for breastfeeding and hygiene do not have significant effects on the efficacy of phototherapy.⁵

The administration of high-intensity phototherapy using a transparent waterbed has been shown to be significantly more effective at reducing bilirubin levels than conventional phototherapy.⁶

No benefit has been found by turning the baby at specific intervals in comparison to supine position of the babies during phototherapy.

Side effects of increased irradiance

The amount of light to which an infant is exposed during phototherapy is minute compared with exposure later in life, even during the first year of life. With the light sources currently used, it is impossible to overdose the patient with phototherapy. Phototherapy is relatively a safe and simple method of treatment. The possible side effects of phototherapy have been subject to extensive and controversial debate. Associated side effects that may occur, especially in premature infants, include rashes (erythema), oxidative injury, dehydration (transdermal water loss), and ultraviolet (UV) light irradiation. Although irradiation of cells with light intensities similar to those used in phototherapy can produce DNA damage, no changes in growth, development, or infant behaviour have been reported in long-term follow-up studies of infants who have received phototherapy.² There have been very few studies showing increased incidence of retinopathy of prematurity only in low birth weight neonates receiving phototherapy, which can be controlled by eye patches. Therefore increased efficacy of phototherapy does not seem to be associated with major side effects.

Minor factors

The efficacy of all kinds of phototherapy instruments should be maintained by proper simple cleaning of the light sources. All the sources should be checked at regular interval for irradiance and lights changed when needed. Ideally, irradiance should be measured at multiple sites under the area illuminated by the unit and the measurements averaged. It is not necessary to measure the irradiance before putting every child in the phototherapy unit; however irradiance should be measured at a fixed interval.

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Dates and Place of WBAP Clinical Meeting 2011

March 31	Institute of Child Healths
April 28	Ramkrishna Mission Seva Pratisthan
May 26	Dr B C Roy Hospital for Children
June 30	Calcutta National Medical College
July 28	R G Kar Medical College
August 25	NRS Medical College
September 29	Medical College Kolkata
October 20	B R Singh Hospital
November 24	IPGME&R and SSKM Hospital
December 29	Apollo Gleneagles Hospital

NRP Provider Course (2011)

3rd April	Uttaar 24 parganas
10th April	Dakhin 24 Parganas
8th May	Dinajpur
15th May	Darjeeling
22nd May	Murshidabad
29th May	Bankura
5th June	Burdwan
12th June	Midnapur

CASE REPORT

A 2 yr-old- male child with bilateral non-pitting leg swelling and scrotal edema - Milroy's Disease

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ABSTRACT

A two year old child presented with bilateral non-pitting leg swelling since one month of age as well as scrotal edema since 6 months without any congenital abnormalities. Relevant investigations were normal except lymphoscintigraphy which revealed atretic lymphatics distal to external iliac nodes. The child was diagnosed as a case of Milroy's disease. He is on regular follow up and doing well with symptomatic treatment.

KEY WORDS: Lymphedema, Milroy's Disease, Lymphoscintigraphy

INTRODUCTION

A child with a swollen leg may represent a difficult diagnostic problem. Lymphedema (LE) may be a more appropriate diagnosis. It can be determined congenitally (primary) or as a consequence of acquired lymphatic failure, due to obstruction or damaged lymphatics (secondary) ^{1,2}. During childhood, primary lymphedema is more common. Primary lymphedema is traditionally classified by the age of onset and include congenital lymphedema (age <1 year), lymphedema praecox (age 1-35), and lymphedema tarda (age >35 years) ³. The primary lymphedema occurs in 1 of 10,000 individuals. Milroy disease is inherited as an autosomal dominant condition associated with variable penetrance. It is rare and constitutes only 10% of cases of primary lymphedema. Actual incidence of Milroy disease is unknown because most patients have been reported in small case-based studies. As the condition is rare, we report here a case of Milroy disease.

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CASE REPORT

A 2 year-old male child presented with swelling of both the lower limbs since one month of age and scrotal edema since six months of age. Swelling of both legs started from feet and was gradually progressive in nature. He was a product of a non-consanguineous marriage. Birth history was uneventful. The developmental milestones were within normal limits. The child was treated with oral steroid for the last 4 months before admission assuming that he might be suffering from congenital nephrotic syndrome. He is the single child in the family and there was no similar illness in the family.

Physical examination revealed both the lower limbs were edematous, firm to touch with mild pitting edema (Fig 1). The length of the lower limbs, local temperature and skin condition were normal. Brawny edema over scrotum with rosy hue of the skin over the scrotum was noted. The inguinal lymph nodes were not palpable. He had a moon facies. His vital signs were within normal limits. Apart from these observations, no other abnormality could be detected on systemic examination which would be expected in



Fig 1. Showing bilateral leg swelling with scrotal edema

different genetic syndrome associated with congenital lymphedema.

The routine examination of urine and blood did not reveal any abnormality. Liver function test (LFT), renal function test (RFT), serum electrolytes, lipid profile were within normal limits. Chest X-ray, abdominal ultrasound (USG), electrocardiogram (ECG) and echocardiogram (ECHO) were within normal limits. Vascular Doppler ultrasound was normal. He subsequently underwent lymphoscintigraphy which revealed lymphatics distal to external iliac nodes were atretic but those above the external iliac nodes were normal. The external iliac nodes were found normal (figure 2).

Though there was lack of similar illness in the family, based on the age of onset, typical distribution as well as nature of progress of lymphedema and positive lymphoscintigraphy finding we considered our case as Milroy disease. He was advised to follow supportive measures like elevation of both legs at bed time, use of crepe bandage, massage etc. As there was no complication due to the condition of the leg no specific treatment was instituted.

DISCUSSION

Persistent, painless swelling, typically of one

(or both) lower limb(s), is usually the first sign of lymphedema (LE) in Milroy's disease. Swelling is often present at birth or soon afterwards and limited in extent. Edema occurs first over the digits and then climb up but does not extend beyond inguinal ligament as observed in our case. The nature of edema (pitting/non-pitting) depends on staging of the disease. There are four (latency, stage I, stage II and Stage III) stages which are made depending on underlying pathological changes. In latency (first) stage lymphedema is reversible but in stage I, edema

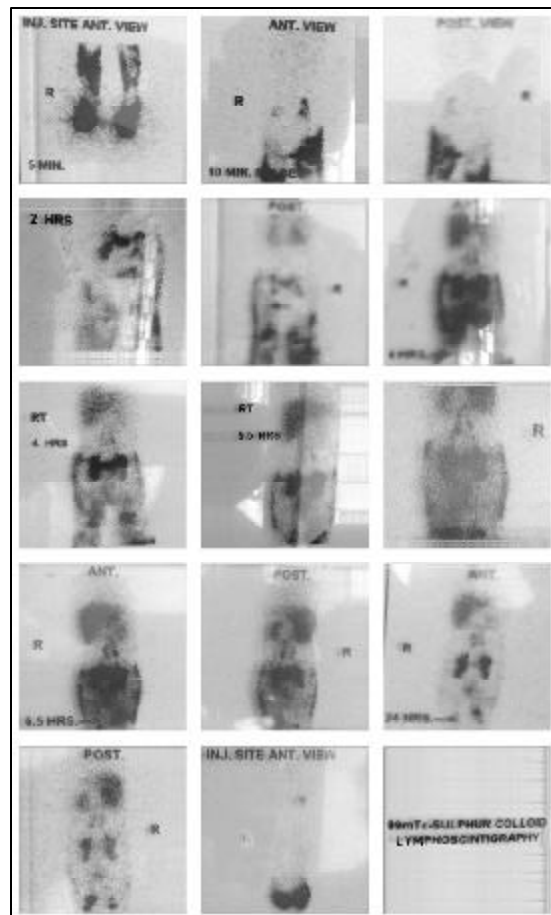


Fig 2. Showing lymphoscintigraphy showing a) lymphatic distal to external iliac nodes are atretic; b) external iliac nodes are normal; c) lymphatics above external iliac nodes are normal.

is pitting in nature and reduces on elevation of limb. In stage II (spontaneously irreversible lymphedema), connective tissue proliferates (fibrosis) and pitting become progressively more difficult. Ultimately fibrosis and sclerosis (severe induration) develops in stage III (Lymphostatic Elephantiasis). Non-pitting edema and skin changes (papillomas, hyperkeratosis, etc.) are found in this stage. Our patient presented in stage II. In case of male child scrotal swelling was observed as in ours. His moon facies was due to oral steroid.

Milroy's disease represents an autosomal dominant disorder thought to be related to defective VEGFR-3⁴ signaling mapped to a part of chromosome arm 5q. This region codes for a tyrosine kinase receptor specific for the function of the lymphatic vessels, though genetic analysis was not done in our case. Hereditary factor could not be traced in our case and this could be explained by the fact that our case might be an index one and follow up for next few generations will establish the family pattern of the condition. Lack of family data was also supported by the opinion of Parker-Weber (Webber and Schluter 1937) where they had stated that if other features were present, a family history is not essential. Non-hereditary congenital lymphedema can also be found in some cases of genetic syndrome associated with lymphedema like Turner's syndrome, Noonan's syndrome, Yellow nail syndrome, arteriovenous malformation, Lymphedema Districhiasis syndrome (double row eye lashes) etc. Our child did not have other associated anomalies that were suggestive of those syndromes. Besides typical presentation and positive family history, currently the most precise diagnosis of Milroy's disease can be made by a lymphoscintigraphy test⁵ which can detect exact location of the lymphatic blockages. In our patient lymphoscintigraphy showed obstruction of lymphatic channel distal to external iliac vein.

Management of Milroy disease is mainly conservative and it includes exercise, self massage, elevation of legs at bed time, compression (such as elasticated stockings or pneumatic machine) and scrupulous attention to skin care. An operation should be a last resort when all conservative measures have failed. Several surgical methods have been attempted to benefit patients with Milroy disease but there is generally only a 30% success rate⁶. Primary lymphedema usually does not progress and stabilizes after several years of activity. Complications are cellulitis, bacteremia, and chylothorax.

CONCLUSION

High index of suspicion is important as Milroy Disease might be an important cause of bilateral swollen limb and scrotal edema which presents since birth or soon after.

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CASE REPORT

A case of Multifocal Tubercular Dactylitis

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ABSTRACT

A four years old male child presented with swelling of multiple joints since 2 years of age. The swelling gradually progressed and few of them developed discharging sinus. X-ray showed lytic punched out lesions in multiple phalanges. Bone biopsy revealed well defined epithelioid granuloma, Langerhan's giant cell with area of central caseous necrosis, suggestive of tubercular etiology. The patient was started on four drug antitubercular treatment under DOTS regime. Follow up showed mark improvement. Thus we report a case of multifocal tubercular dactylitis, highlighting its presentation as a case of indolent extremity swellings, so as to alert physicians that the diagnosis should be considered in any patient presenting with a swollen finger of insidious onset

KEY WORDS: Dactylitis; Tuberculosis

INTRODUCTION

Tubercular dactylitis is a rare entity (4% of all osteoarticular tuberculosis). It is well tolerated for a long time, often leading to delay in seeking medical care. Further, because of its non-specific clinical and radiological features, it is often misdiagnosed in early stages, leading to a delay in definitive therapy.

CASE REPORT

A four year old boy presented with swellings of multiple joints of both hands and feet for a period of 2 years. Both the ankle joints were also swollen for the same duration. The swellings were painless to start with but were painful to touch for one year prior to presentation. They were slowly but progressively increasing in size. After one year of their appearance, the child developed discharging sinuses overlying the hands and feet swellings; the discharge was

yellowish in color. There was no discharge or sinus overlying the ankle swellings. There was no history of trauma, repeated blood transfusion, chronic cough, night sweats, significant loss of weight or appetite or tubercular contact. The child had received BCG vaccine at birth. The child had earlier been treated with oral antibiotics and herbal medications, but no benefit was observed.

On examination, he was an afebrile, playful child with a weight of 13.5 kg (> 50th centile) and height of 103cm (~50th centile). Mild pallor was present. There was no clubbing, significant lymphadenopathy or pedal edema. Multiple fusiform swellings were present over the extremities, involving the index and the little finger of the right hand, the left thumb and index finger, the right second and fourth toe, along with bilateral ankle swellings. (Fig.1) There was no restriction of movements at the fingers or feet. Except for the ankle joint swellings, all the swellings were tender and associated with

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Fig 1. *Clinical Photograph showing discharging sinuses*

an overlying sinus with crusted seropurulent discharge. Both the ankle joints were diffusely swollen, non tender, without any overlying sinus or ulcer and without any restriction of movements. Rest of the systemic examination was normal.

Hemogram revealed low hemoglobin of 7.48g/dl; TLC of 5,800/mm³; DLC: N60%, L35%, M2%, E3%; and a raised ESR of 60 mm in the first hour. Peripheral smear showed microcytic, hypochromic picture. Swab from the discharge was sent for gram staining, AFB staining, KOH preparation for fungi, and culture and sensitivity,



Fig 2. *Radiograph of both hands showing lytic lesions*

all of which turned out to be negative. HIV-ELISA and serum VDRL were negative. Hemoglobin electrophoresis revealed no abnormality. Tuberculin test was negative at 72 hours. Chest X-ray was normal. X-Ray of both the hands revealed lytic, punched out lesions in the right 2nd and 5th ; and left 1st and 2nd proximal phalanx, with marked surrounding soft tissue swelling. There was no involvement of the adjacent joints. (Fig.2) The foot X- ray showed similar features at the involved sites. There was diffuse soft tissue swelling overlying both the ankle joints. Bone biopsy revealed well defined epithelioid granulomas, Langerhan's giant cells with areas of central caseous necrosis, suggestive of tubercular etiology.

Considering the diagnosis of tubercular dactylitis, the child was started on four drug antitubercular treatment comprising of isoniazid, rifampicin, pyrazinamide and streptomycin under DOTS regime. On follow up after two months, there was marked improvement in the symptoms in the form of complete disappearance of pain and discharge and a noticeable decrease in the size of swellings.

DISCUSSION

Although tuberculosis (TB) is an ancient disease, known to exist even in prehistoric times; it still is endemic in large parts of the world. Familiarity with the protean manifestations of the disease is thus, essential.

A quarter to a third of pediatric cases develop extrapulmonary involvement.^{1,2} Skeletal TB is uncommon, comprising 10% to 20% of all cases of extrapulmonary TB.^{3,4,5} In children ,it occurs by hematogenous spread, and often becomes symptomatic after 1-3 years of initial infection. Only 1/3 of patients with skeletal tuberculosis are diagnosed with concomitant active pulmonary disease.⁶ In areas with high prevalence, skeletal tuberculosis is a disease

primarily of the young. It is commoner in children aged between 1-6 year and in adults between 20-50 years.^{7,8} It is rare in children over the age of 10 years.⁷ In developed countries, it has been seen more commonly in the immigrant population.⁸

Multifocal bone involvement can occur, especially in children. Tubercular spondylitis is the most common form (50%), followed by arthritis.⁹ Tubercular infection of the short tubular bones of hands and feet is known as tubercular dactylitis. It is an unusual form of skeletal tuberculosis, contributing to only 4% of the cases with osteoarticular TB.⁹ Bones of hands are more commonly involved than those of feet, with the proximal phalanx of the index and middle finger being the commonest sites.⁷ Tubercular dactylitis often involves multiple sites, in as many as 25-30% of the cases.⁸

The condition usually presents with swelling of the affected part, which may or may not be painful. Concomitant joint involvement may be present, as in our case, as a result of metaphyseal spread to the joint. Fistulas and sinuses occur in neglected cases.

There is no single pathognomic finding with which to make the diagnosis of tubercular dactylitis. Radiography, bone biopsy and demonstration of AFB are the frequent methods used. Fusiform soft tissue swelling and periostitis are most common radiographic findings. Round or oval lesions with poorly defined margins in bone adjacent to affected joint are a common finding in extremity tuberculosis, especially in children.¹⁰ As underlying bone is destroyed, a cyst like cavity forms and remaining bone appears to be ballooned out. This appearance is known as 'spina ventosa'. Biopsy findings include granulomatous reaction with central caseous necrosis and Langerhan's giant cells. Culture of the bone tissue is the gold standard for diagnosis; however skeletal tuberculosis is a paucibacillary

lesion and it is difficult to demonstrate or culture acid-fast mycobacteria from these lesions¹¹, as in our patient. Bone biopsy confirms the tuberculous etiology, as histologic findings are highly typical. Tubercular dactylitis has to be evoked with epidemiological, clinical and radiological arguments. In endemic regions, the clinical features, radiological appearance and elevated ESR are sufficient to diagnose tuberculosis and begin treatment.¹² Management consists of standard antitubercular treatment for a prolonged duration.¹¹

Sickle cell dactylitis exhibits features similar to that of tubercular dactylitis but is characteristically bilateral and dissolution of the sickle cell lesions is typically followed by irregularly sclerotic new bone formation. Other differential diagnoses include congenital syphilis, pyogenic osteomyelitis, fungal infections and tumors.

Tubercular etiology should be considered in any patient presenting with a swollen finger or toe of insidious onset. Entertaining a high index of suspicion is important as functional outcome depends on early diagnosis and delay may lead to debilitating sequelae.

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Xeroderma Pigmentosum

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A 2 year old male child, a product of consanguineous marriage, presented with history of skin rash mostly on sun-exposed areas since early childhood. His developmental milestones were normal. There was no similar family history. He had extensive skin rash involving, mostly, the face and the exposed neck in the form of erythema, both hyper and hypopigmentation and also atrophy (Figure 1). There was constant lacrimation. His anthropometric measurements and other systems were within normal limits. Routine investigations of urine and blood were normal. There were no porphyrins in urine. CT scan of brain, BERA and VEP studies were normal. Skin fibroblast culture and testing for DNA repair, UV sensitivity and unscheduled DNA synthesis could not be done due to lack of facilities.

Some of the diagnostic possibilities which came up were Xeroderma Pigmentosum (XP), Cockayne syndrome, porphyria, Rothmund-

Thomson syndrome, Hartnup Disease and Bloom syndrome. Cockayne syndrome has the skin manifestation like that of XP along with growth retardation. Rothmund-Thomson syndrome has bone and joint deformities along with poikiloderma. Hartnup disease usually has failure to thrive, photosensitivity along with neurological features. Bloom syndrome has short stature and a butterfly rash on the cheeks on exposure to sunlight. So based on history and clinical examination, a diagnosis of xeroderma pigmentosum was made.

XP is a genetically heterogeneous disorder and more than 9 genes have been implicated. One can reach a diagnosis with a fair degree of certainty by a thorough history and clinical examination. Parents were counselled regarding the importance of avoidance of sun-exposure. He was also planned to be kept under follow up for monitoring for skin malignancies.

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CLINICAL IMAGE: Xeroderma Pigmentosum



Facial profile of the child showing the skin lesions