

Pre-natal and Post-natal Risk Factors for Mental Retardation among Children in Varanasi

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ABSTRACT The present study was aimed to investigate the pre-natal and post-natal risk factors for mental retardation among children in Varanasi. The sample of the study was categorized into three categories *viz.* mild, moderate and severe. The sample size consisted of 150 mentally retarded children: 34 mild, 96 moderate and 20 severe in the age group of 5-20 years. Purposive sampling technique was done with the help of interview schedule. Results of the study indicated that the maternal age at conception, excessive use of nicotine and alcohol during the pre-natal period, child prematurity and nutritional disorder in the natal and post-natal period were the prime causes behind mental retardation.

INTRODOUCTION

Risk factors prior to birth can be categorized in accordance with the timing, duration, dosage of exposure, and their mode of action; these variables determine which tissues/organs in the offspring are affected and to what extent (Hebebrand et al. 2014). The prenatal period typically referred to the time from conception to birth, during which a host of maternal exposures to for example drugs, medications, toxins, infectious agents, radiation as well as maternal psychological factors can directly or indirectly influence the offspring's brain structure and/or function (Hebebrand et al. 2014). Postnatal causes account for 3%-15% of all developmental disabilities and often are preventable (Lipkin 1991). Mental retardation (MR) is a genetic disorder manifested in significantly below average overall intellectual functioning and deficits in adaptive behaviour. It is a particular state of functioning that begins in childhood and is characterized by decreased intelligence and adaptive skills and also is the commonest developmental disorder (Armatas 2009; Bregman 1991). Currently "mental handicap" is the term which is used

for mental retardation. It is a condition of sub-average intellectual function combined with deficits in adaptive behavior. Persons with less than average mental ability or intelligence are called mentally challenged (Manjunatha 2002). Nearly 83 million of the world's population is estimated to be mentally challenged, with 41 million having long-term or permanent disability. It ranks fourth in the list of leading causes of disability (WHO 2013).

Mentally challenged stage may occur as part of a syndrome or broader disorder but is most commonly an isolated finding. Mentally challenged children are one of the most frequently encountered, and most distressing, disabilities among children in most industrialized and developing countries world-wide (Kiely 1998; Matson et al. 2014). The prevalence varies considerably because of the varying criteria and methods used in the surveys, as well as differences in the age range of the samples. The overall prevalence of mental retardation is between 1-3%, with the rate for moderate, severe and profound retardation. It is commoner in developing countries because of the higher incidence of injuries and anoxia around birth, and early childhood brain infections. Population studies have shown that overall prevalence of mild to severe mental retardation ranged from 2.5 to 5 per thousand. Genetic contribution to this group accounts for 15-30% (Buka et al. 2014; Stein and Susser 1982).

Among mentally challenged children the prenatal causes of mental retardation include congenital infection such as cytomegalovirus, toxoplasmosis, herpes, syphilis, rubella and human immunodeficiency virus, prolonged maternal fever in the first trimester, exposure to anticonvul-

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sants or alcohol, and untreated maternal phenylketonuria (PKU). Complications of prematurity, especially in extremely low-birth-weight infants, or post-natal exposure to lead can also cause mental retardation (Piecuch et al. 1997; Tsai et al. 2014). An etiological investigation included a pre-natal history with construction of a three generation pedigree, information about the mother's health during pregnancy with particular attention to possible use of alcohol or drugs, and clinical examination with registration of neurological impairments including epilepsy, cerebral palsy, and microcephaly, and dimorphic features (Chao et al. 2014).

The problem of Mental Retardation in India is one of the exceptional complexities. It occurs, not only because widely different ethnic elements have entered into the population, but its occurrence is mostly because of the caste system in perpetuation with the fixed hierarchical order in India. Besides, the most important thing is to bring about public awareness for the problem of mental retardation so that it is possible to train and educate the mentally retarded children so that they will become self-dependant and will not be a burden on their family members as well as to the society. Early detection of the mental retardation sometimes can help to take remedial steps in time. Mental retardation is mainly a social educational problem rather than medical problem. Hence, there is a need for separate Institutions with sophisticated technology to provide necessary facilities to rehabilitate different age-groups of mentally retarded children.

METHODOLOGY

The present research is a descriptive-*cum*-exploratory attempt to study etiological factors of mentally challenged children in Varanasi city.

Sample

It was a cross-sectional study. A visit was made to school for mentally challenged children at Varanasi and a total of 150 mentally challenged students and their parents were interviewed and

examined. All the children, that is, 93 boys and 57 girls were enrolled in the school. A purposive sampling technique was used to select the sample.

Procedure

Materials used were a printed pre-tested and pre-designed interview schedule. Data collection was done from (i) case history records (adopted by National Institute for the Mentally Handicapped) for children and their parents and (ii) interview method.

Procedure for Data Analysis

The data was collected by personal visits to special school. Interview schedule method was used for data collection. First of all, a rapport was established with subjects (parents of mentally challenged children) and then relevant information was obtained. Both qualitative and quantitative analysis was done. The responses obtained were coded, tabulated and then percentages were drawn and content analysis was done.

RESULTS AND DISCUSSION

The results of the study are based on the information collected from the respondents through interviews.

Table 1 gives the details of sex wise distribution of mentally retarded children. Among one hundred fifty children, ninety-three were boys (62%) and fifty-seven were girls (38%), male to female ratio being 1.6:1. From Table 1 it is apparent that the mental retardation is more common amongst the boys as compared to girls. The findings of present study are consistent with the previous research (Klusek et al. 2014). However, this conclusion may also stem from the fact that mostly the parents of mentally retarded boys are more willing to send their wards to the special schools in comparison to parents of mentally retarded girls.

Table 1: Sex wise distribution of mentally retarded children

Sex	Mild (n=34)		Moderate (n=96)		Severe (n=20)		Total (n=150)	
	f	%	f	%	f	%	f	%
Boys	22	14.7	58	38.7	13	8.7	93	62.0
Girls	12	8.0	38	4.7	7	4.7	57	38.0

Table 2 displays that 79.4% mentally retarded children were born when their mother's age was between 21-35 years, 13.3% born when their mother's age was above 35 years and only 7.3% mentally retarded children were born when their mother's age was below 20 years. It is well known that age of the mother is a highly significant factor for giving birth to a normal baby. Mothers above the age group of 35 years face higher risks for chromosomal abnormalities, prematurity, complications during pregnancy and congenital abnormalities in the offspring. Very young mothers, below 15 years of age, whose reproductive system is still immature and whose bodies are still growing, also face greater risk of producing abnormal baby (Chico 2014). Additionally, the observation in Table 2 may be ascribed to the legal age in India which is 18 years and mostly the mother's age at the time of first delivery lie between 21-35 years. As far as father's age is concerned, the chances of having a mentally retarded child in the age of above 50 years.

Table 3 shows the mental retardation in children on the basis of their mother's education. The table documents that 39.3% mothers who were high-school pass have more chances of giving birth to mentally retarded children, 28% mothers were educated up to intermediate, 19.3% were educated up to class 8th and 13.3% were graduate. The value of Chi-square were found to be significant (p<0.05). This shows that there is a significant relationship between mother's educational level and mental retardation. Hence, it can be rationalized that as the educational level of the mother's rise there will be low rate of mental retardation amongst their children. This observation also stems from the fact that in India the gross enrolment rate in higher education is still around 12% and this is even smaller in females. Additionally, the graduate mothers try to take all the necessary safety measures during pregnancy.

Table 4 presents income wise distribution of the families shows that the highest percent (37.3%) of parents were earning Rs.10,000 to

Table 2: Mother's age at the time of birth of their mentally retarded children

Age (Years)	Mild (n=34)		Moderate (n=96)		Severe (n=20)		Total (n=150)	
	f	%	f	%	f	%	f	%
<20	2	1.3	8	5.3	1	0.7	11	7.3
21-35	26	17.3	78	52.0	15	10.0	119	79.4
>35	6	4.0	10	6.7	4	2.7	20	13.3

Table 3: Educational level of mothers of mentally retarded children

Educational Status	Mild (n=34)		Moderate (n=96)		Severe (n=20)		Total (n=150)	
	f	%	f	%	f	%	f	%
Upto 8 th	6	4.0	19	12.7	4	2.7	29	19.3
High School	10	6.7	44	29.3	5	3.3	59	39.3
Intermediate	12	8.0	22	14.7	8	5.3	42	28.0
Graduate	6	4.0	11	7.3	3	2.0	20	13.3

Table 4: Distribution of children with mental retardation according family income

Monthly family income (Rs.)	Mild (n=34)		Moderate (n=96)		Severe (n=20)		Total (n=150)	
	f	%	f	%	f	%	f	%
Up to 5000	2	1.3	5	3.3	4	2.7	11	7.3
5000 to 10,000	6	4.0	18	12.0	5	3.3	29	19.3
10,000 to 15,000	9	6.0	41	27.0	6	4.0	56	37.3
15,000 to 20,000	10	6.7	19	12.7	3	2.0	32	21.3
20,000 and above	7	4.7	13	8.7	2	1.3	22	14.7

15,000 per month, 21.3% parents were in the income range of 15,000 to 20,000 per month, while 14.7% parents were earning more than Rs. 20,000. The rest of the parents (7.3%) were earning up to 5000 Rs. per month. It has been observed that children born in poor families frequently suffer from mental retardation because of malnutrition, disease-producing conditions, inadequate medical care, and environmental health hazards. In addition, children residing in underprivileged area may be deprived of many common uncultured day-to-day experiences provided to other young children. The findings of the present study are in line with the finding of earlier research (Rajaraman et al. 2014) which shows that economic conditions are the prime causes of mental retardation among children.

Table 5 reveals that almost all mothers (90.0%) in took nicotine in tea and coffee, 56% mothers stated that they had taken *pan, surti, gutka, gul* during the first three months of their pregnancy and 37% mothers frequently drunk soft drinks, beverages and ate canned foods, 44% mothers had taken harmful medicine during

pregnancy. From Table 5, it can be concluded that the one of the causes of mental retardation may be the maternal exposure to teratogens, or outside elements that a mother may encounter during pregnancy which are damaging to the developing baby. Teratogens include toxins (*pan, surti, gutka*, gull intake of nicotine, soft drinks), medication, infections or diseases (Gopalan et al. 2014; Barkoukis et al. 2001). The National Institutes for Health (NIH 2014) reported that drinking alcohol during pregnancy is the leading preventable cause of mental retardation.

From Table 6, it is apparent that 27.3% of mothers were adversely affected from X-ray irradiation, 18.7% mothers had suffered from nutritional problem, 14.7% mothers aborted their pregnancy before or after birth of mentally retarded child, only (4%) mothers had mother-child blood incompatibility. Significant association were found in factors affecting in pre-natal period and born mentally retarded children as shown through ANOVA ($F=34.63, p<0.05$). Besides, it is evident that the X-ray exposure to mothers during pregnancy resulted in abortions or congen-

Table 5: Drugs and other addictions among mothers of mentally retarded children during pregnancy

Drugs and Addictions	Mild (n=34)		Moderate (n=96)		Severe (n=20)		Total (n=150)	
	f	%	f	%	f	%	f	%
Pan, Surti, Gutka, Gul	11	7.3	63	42.0	10	6.7	84	56.0
Nicotine (excess use of tea, coffee)	30	20.0	88	58.7	17	11.3	135	90.0
Soft drinks, beverages, canned food	8	5.3	34	22.7	13	8.7	55	36.7
Harmful medication	13	8.7	44	29.3	9	6.0	66	44.0

Note- Multiple responses included, percentage may exceed 100.
Statistical Significance: $\chi^2 = 7.911, df = 6, p > 0.05$ NS

Table 6: Factors affecting the pre-natal period

Factors	Mild (n=34)		Moderate (n=96)		Severe (n=20)		Total (n=150)	
	f	%	f	%	f	%	f	%
Nutritional problems	7	4.7	18	12.0	3	2.0	28	18.7
Irradiations(3-5 times)	9	6.0	24	16.0	8	5.3	41	27.3
Abortion	5	3.3	13	8.7	4	2.7	22	14.7
Rh-incomptability	-	-	3	2.0	3	2.0	6	4.0

ANOVA

Source	df	SS	MSS	f
Mental retardation	2	37.56	18.78	3.93
Factors	2	330.89	165.45	34.63*
M.R. x Factors	4	19.11	4.78	
Total	8	387.56		

ital defects. These malformations were caused by direct effect of high levels of irradiation on the young fetus. Malnutrition in mother is a very serious cause for mental retardation in the child. There is also an evidence that mother-child blood incompatibility in the classical major blood grouping (A, B and O) may also be a cause of mental retardation.

Table 7 shows the equal percentage (12.7%) of mothers of mentally retarded children suffering from hypertension and fever, 7.3% mothers were suffering from infection, 6% mothers were found diabetic and only 4.7% of mothers suffered from jaundice during first three months of pregnancy. The ANOVA value shows that there

is significant relationship between the maternal complications during pregnancy ($F=6.03^*$, $p<0.05$) and mental retardation of children ($F=6.90^*$, $p<0.05$). The ANOVA value indicates that there is significant relationship between the maternal complications during pregnancy and mental retardation of children. The findings of present research are consistent with the finding of earlier research (Pieuch et al. 1997; Walder et al. 2014) which shows that the conditions like: cytomegalovirus, toxoplasmosis, herpes, syphilis, rubella and human immunodeficiency virus, prolonged maternal fever in the first trimester, exposure to anticonvulsants or alcohol and untreated maternal phenylketonuria (PKU) were

Table 7: Presence of diseases in mothers of mentally retarded children during pre-natal period

Disease	Mild (n=34)		Moderate (n=96)		Severe (n=20)		Total (n=150)	
	f	%	f	%	f	%	f	%
Hypertension	4	2.7	10	6.7	5	3.3	19	12.7
Infection	2	1.3	6	4.0	3	2.0	11	7.3
Jaundice	1	0.7	4	2.7	2	1.3	7	4.7
Diabetes	2	1.3	7	4.7	-	-	9	6.0
Fever	3	2.0	12	8.0	4	2.7	19	12.7

ANOVA				
Source	df	SS	MSS	f
Mental retardation	2	86.25	43.13	6.90*
Complications	3	113.17	37.72	6.03*
M.R. x Complications	6	37.50	6.25	
Total	11	236.92		

Table 8: Post-natal causes of mentally retarded children

Post-natal causes	Mild (n=34)		Moderate (n=96)		Severe (n=20)		Total (n=150)	
	f	%	f	%	f	%	f	%
Infection	3	2.0	60	40.0	13	8.7	116	77.3
Jaundice	7	4.7	12	8.0	5	3.3	24	16.0
Convulsion	-	-	6	4.0	4	2.7	10	6.7
Injury	-	-	11	7.3	6	4.0	17	11.3
Nutritional disorder	10	6.7	63	42.0	16	10.7	66	44.0

Note: Multiple responses included, percentage may exceed 100

ANOVA				
Source	df	SS	MSS	f
Mental retardation	2	2433.67	1216.83	2.86
Post-natal causes (between categories)	3	2392.67	797.56	1.88
M.R. x Post-natal (within categories)	6	2551.33	425.22	
Total	11	7377.67		

closely related to low birth weight and premature birth of the baby.

Table 8, provides information regarding the post-natal causes of mentally retarded children. It indicates that maximum 77.3% children become mentally retarded due to infection followed by nutritional disorder 44.0%. Additionally, jaundice and injury also play role as the cause of the mental retardation but convulsion is the meager factor for the mental retardation. Besides, the ANOVA result shows that there is no significant relationship between post-natal causes and mental retardation of children. The findings of present study are in agreement with the previous research (Gulati and Vasir 2005), which also showed that amongst mentally retarded children the main post-natal problems are infection and nutritional disorder.

CONCLUSION

In summary mental retardation may be caused by the problems that occur during pregnancy and birth. This included maternal nutritional deficiencies, toxemia, infections such as rubella, maternal phenylketonuria (even if the fetus doesn't have the condition), use of drugs or alcohol, maternal injury during pregnancy, extreme prematurity, low birth weight, peri-natal injury, or lack of oxygen at birth. Retardation can also be the result of medical conditions and injuries that occur after birth, including metabolic disorders, severe childhood malnutrition, prolonged high fever, near drowning, lead poisoning, severe mental disorders such as autism, and infections such as meningitis that affect the brain. Environmental factors influencing mental retardation include deprivation of physical or emotional nurturance and stimulation. In addition, inadequate pre-natal care is associated with prematurity and low birth weights, which are linked to mental retardation.

This investigation lay emphasis on planned pregnancies, regular pre-natal care, regular health checkups for mother and child, immunization, nutrition prevention of environmental hazards and accidents, early identification and screening, genetic studies and counseling, family planning, and creation of awareness among the general population.

RECOMMENDATIONS

On the basis of present study the following recommendations are made:

1. It would be interesting to have a longitudinal study on a similar topic in the future.
2. Large populations having all categories of mental retardation can also be included in future investigations.

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