

## Short Review

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# Mental retardation and oral health: An insight

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## Abstract

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 most common developmental disorder, often missed by clinicians. The condition is present in 2 to 3 percent of the population, either as an isolated finding or as part of a syndrome or broader disorder.

Looking at various studies it was concluded that the oral health situation of these groups must be improved and a suitable system devised for delivery of preventive measures. Special consideration must be given to improving the oral health of these groups. Oral health should be included in each child's individual health care plan with oral health promotion programmes aimed specifically at special needs schools and their parents. Children should be instructed to clean their teeth twice a day and oral hygiene should be practised at school and supervised by teachers. There should be a provision for in-service training for teachers, school staff and parents on how to promote good oral health specifically for these children with disabilities.

## Introduction

Mental Retardation (MR) is a genetic disorder manifested in significantly below average overall intellectual functioning and deficits in adaptive behaviour. Mental retardation is a particular state of functioning that begins in childhood and is characterized by decreased intelligence and adaptive skills and also is the most common developmental disorder [1,2]. MR in young children is often missed by clinicians. The condition is present in 2 to 3 percent of the population, either as an isolated finding or as part of a syndrome or broader disorder. It is not a medical disorder, nor a mental disorder. It reflects the "fit" between the capabilities of individuals and the structure and expectations of their environment [1].

### AAMD definition of mental retardation [3]

Mental retardation is a disability characterized by significant limitations both in intellectual functioning and in adaptive be-

havior as expressed in conceptual, social, and practical adaptive skills [3].

The AAMD classifies retardation into four categories according to intelligence quotient (IQ):

Category	IQ level
Mild	50- 55
Moderate	35-40
Severe	20-25
Profound Below	20-25

## Epidemiology of mental retardation

The disabled comprise a substantial section of the community and it is estimated that there are about 500 million people with disabilities worldwide. The recent National Sample Survey Organization (NSSO: 2003) report no. 485(58/26/1) suggests that the number of disabled persons in the India is estimated to be 18.49 million, accounting for about 1.8% of the total population, while the mentally retarded population amounted to 0.44 million individuals [15].

## Causes of mental retardation

Are numerous and include genetic and environmental factors. Diagnosis is highly dependent on a comprehensive personal and family medical history, a complete physical examination and a careful developmental assessment of the child. These will guide appropriate evaluations and referrals to provide genetic counselling, resources for the family and early intervention programs for the child [5].

It is also believed that behavioural or societal factors such as poverty, malnutrition, maternal drug and alcohol use, as well as severe stimulus deprivation can contribute to MR [6]. Unfortunately, in approximately 30 to 50 percent of cases, the etiology is not identified even after thorough diagnostic evaluation [4,7].

Some persons have a congenital malformation of the brain; others had damage to the brain at a critical period in pre- or postnatal development. Acquired causes of retardation include near drowning, traumatic brain injury and central nervous system malignancy. The most common cause of MR in industrialized nations is fetal alcohol syndrome with an incidence rate of 1 in 100 births. The second leading known cause of MR is Down syndrome, or trisomy 21, with an incidence rate of 1 in 800-1.000 births [8].

### 1. Genetics conditions

A number of single-gene disorders result in MR. Many of these are associated with atypical or dysmorphic physical characteristics such as fragile X syndrome, neurofibromatosis, tuberous sclerosis, Noonan's syndrome and Cornelia de Lange's syndrome [9,10]. Other genetic conditions include Phelan-McDermid syndrome (22q13del), Mowat-Wilson syndrome, genetic ciliopathy. In the rarest of cases, abnormalities with the X or Y chromosome may also cause disability. 48, XXXX and 49, XXXXX syndrome affect a small number of girls worldwide, while boys may be affected by 47, XYY, 49, XXXXY, or 49, XYYYY.

### 2. Prenatal problems

MR can result when the fetus does not develop inside the mother properly. Moreover, prenatal causes include congenital infections such as 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). Complications of prematurity, especially in extremely low-birth-weight infants, or postnatal exposure to lead can also cause MR [11].

### 3. Perinatal problems

Perinatal causes involve late pregnancy (complications of pregnancy, diseases in mother such as heart and kidney disease and diabetes and placental dysfunction), during delivery (labour) (severe prematurity, very low birth weight, birth asphyxia, difficult or complicated delivery and birth trauma), neonatal (septicaemia, severe jaundice, hypoglycemia [13]).

### 4. Postnatal problems (in infancy and childhood)

Postnatal problems can be brain infections such as tuberculosis, Japanese encephalitis, and bacterial meningitis, head injury, chronic lead exposure, severe and prolonged malnutrition and gross understimulation [14].

### 5. Metabolic disorders

Metabolic disorders are another possible cause of MR. In some cases (e.g., PKU, hypothyroidism), retardation is preventable with early treatment. Other disorders (e.g., mucopolysaccharidosis, sphingolipidoses) are less responsive to early intervention.

### 6. Exposure to certain types of disease or toxins

Diseases like whooping cough, measles, or meningitis and poisoning like lead or mercury can cause MR if medical care is delayed or inadequate.

### 7. Iodine deficiency (cretinism):

Iodine deficiency affecting approximately 2 billion people worldwide is the leading preventable cause of MR in developing countries where iodine deficiency is endemic.

**Table 1:** Studies related to oral health status in mental retardation.

Sl. No	Article Title	Aim of the Study	Material and Methods	Results & Discussion
1.	Bratel J, Berggren U, Hirsch JM. Electric or manual toothbrush? A comparison of the oral health of mentally handicapped adults. <i>Clin Prev Dent.</i> 1988; 10: 23-26. [15].	The effect of electric versus manual toothbrushes on oral hygiene in mentally handicapped population was investigated.	23 moderately mentally handicapped patients were selected. Subjects divided into study and control groups. Plaque and gingival indices were scored at day 0, after 1 week, after 4 weeks and finally after 12 weeks.	This study indicated that electric toothbrushes may be a valuable tool for moderately mentally challenged adults who are able to brush their teeth themselves. However the lack of significant differences between groups contradicts any superiority of electric toothbrushes compared with normal brushes.

2.	Bratel J , Berggren U. Long term oral effects of manual or electric toothbrushes used by mentally handicapped adults. Clin Prev Dent 1991; 13: 5-7. [16].	To investigate the long term oral effects in mentally handicapped patients using an electric toothbrush as compared to manual brushing.	23 moderately mentally handicapped patients were selected and sampled into two study and two control groups. study group used electric tooth brushes while the control group used manual tooth brushes. Plaque and gingival indexes were scored at day 0, after 3 months and after 16 months.	No significant changes were found in or between the groups regarding plaque scores. Thus the study concluded that an electric toothbrush is not superior to a manual toothbrush.
3.	Sachin Goyal , Betsy S. Thomas, Khandige Mahalinga Bhat, G. Subraya Bhat. Manual toothbrushing reinforced with audiovisual instruction versus powered tooth brushing among institutionalized mentally challenged subjects-A randomized cross-over clinical trial: Med Oral Patol Oral Cir Bucal. 2011;16 359-64. [17].	To assess and compare the effectiveness of manual tooth brushing reinforced with audiovisual instructions with powered tooth brushing among the institutionalized mentally challenged individuals under supervision of trained caretakers.	A randomized cross over clinical trial of 6 month duration which included 16 subjects consisting of two phases of 3 months, for each of the 2 groups. In group-A subjects were given manual toothbrushes with audiovisual aid followed by powered toothbrushes and vice versa for group-B. All the subjects were instructed by trained care takers. An evaluation of the plaque and gingival scores was done at the end of 1,2 & 3 months for both the groups.	For mentally challenged individuals manual toothbrushes reinforced with audiovisual instructions for brushing may be comparable to the use of powered toothbrushes.
4.	Cem Dogan M, Alacam A, Asici N, Odabas M, Seydaoglu G. Clinical evaluation of the plaque-removing ability of three different toothbrushes in a mentally disabled group. Acta Odontol. 2004; 62: 350-54. [18].	To evaluate the efficacy of plaque removal of three different toothbrushes on mentally disabled children in two different age groups.	15 children aged 6-12 and 15 children aged 13-18 with mild mental disabilities participated in the single blind clinical study. After 1 week of application the Quigley hein plaque index and the approximal plaque index were used to assess the oral hygiene status of each participant. This was followed by a week of recess before each group switched to next type of toothbrush.	The study indicated that the electric toothbrush is the most effective for removing dental plaque in mentally disabled children.
5.	Stefanovska E, Nakova M, Radojkova-Nikolovska V, Ristoska S: Tooth brushing intervention programme among children with mental handicap, Brastisl Lek Listy 2010;111:299-302. [19].	To evaluate the results of six months intervention program concentrated on independent manual skills, OHI levels were detected by Green-Vermillion and CPITN index levels to characterize the gingival and periodontal health.	Supervised tooth brushing program was carried out among 100 school children at the age of 9-12 and 13-16 years with low and moderate mental handicap.	This program gave promising results and was effective in reducing the plaque and gingivitis score.
6.	Michele P. Carr, Edward S. Sterling, Susan M. Baumhoyer: Comparison of the Interplak and manual toothbrushes in a population with mental retardation/developmental disabilities (MR/DD) Spec Care Dentist 1997;17:133- 6. [20].	To determine whether there was a difference in the oral health between a group of residents with mental retardation using the Interplak and a group using manual toothbrushes.	46 residents from four Franklin county group homes completed the study. Each group home was divided into two study groups, one using the Interplak and the second using manual toothbrushes. Gingival index and Simplified oral hygiene index were used measuring done at 3,6,9,12 months.	Significant improvement in the gingival index over a 12 month period for the residents using the Interplak compared with manual tooth brush.
7.	Yuko Mori, Atsuo Amano, Shigehisa Akiyama; Effects of short professional mechanical tooth-cleaning (PMTc) program in young adults with mental disabilities. [21].	To evaluate the usefulness of a short professional mechanical tooth-cleaning (PMTc) program to improve periodontal conditions and caries susceptibility.	10 young adult patients with mental and/or physical disabilities were selected. The PMTC program was carried out once on each of 6 sextants of the full mouth during 6 visits at two week intervals.	The PMTC program can be effective in adults with mental disabilities especially in reducing gingival inflammation.
8.	Stachurski P, Warsz M, Rudnicka-Siwiek K, Ziolo A: Assessment of the state of dentition and oral hygiene in 16-25-year-old young people with mild and moderate mental disability. Advances in Medical Sciences: 2006; 51: 200-203. [22].	To assess the state of dentition and oral hygiene in 16-25 year old young people with mild and moderate mental disability in comparison with a control group of healthy young people at the same age.	144 young people aged 16-25 with mild and moderate mental disability were selected. They were divided into control and experimental group. Frequency of dental caries, DMF number, Dental caries treatment index(DTI), Oral hygiene index(OHI), percentage of traumatic injuries and sealed teeth recorded.	The state of dentition in 16-25 yrs old young people with mild and moderate mental disability is unsatisfactory, thus suggesting the need for special dental care in these individuals.
9.	James Day, Michael D. Martin, Mae Chin. Efficacy of a sonic toothbrush for plaque removal by caregivers in a special needs population: Spec Care Dentist 1998;18:202-60. [23].	To evaluate the efficacy of sonic toothbrush for plaque removal by caregivers in a special needs population.	40 subjects with special needs were enrolled in this study. In this 6 week study the efficacy of sonic toothbrush was compared with manual brushing. Evaluations of plaque score levels were made at 2,4 and 6 weeks according to sillness and loe index.	Sonic toothbrush may be effective way to provide improved oral health to nursing home subjects when oral care is caregiver provided.
10.	Pia Gabre, Lars Gahnberg. Inter-relationship among degree of mental retardation, living arrangements and dental health in adults with mental retardation [24].	To study the inter-relationship among the degree of mental retardation, the way of living and dental health in adults with mental retardation.	132 adults between ages of 21 and 40 yrs who are mentally retarded are examined on two occasions, one year apart. All subjects had regular dental care for at least 10 years. The clinical examinations included bitewing radiograph and degree of mental retardation was assessed by a professional psychologist.	The results showed that the degree of mental retardation as well as living arrangements are factors influencing the dental health of persons with mental retardation.

11.	Chung, Dae Hyun, Lee, Man Sup, Kwon, Young Hyuk. Comparison between electric and manual toothbrush in oral hygiene of mentally retarded children, <i>Journal of Periodontal &amp; Implant Science</i> :1983:13 [25].	To compare the effect of electric and manual toothbrush in oral hygiene of mentally retarded children	35 mentally retarded children were divided into 2 groups. 22 mentally retarded children used electric toothbrush while the other 13 children used manual toothbrush. Each subject was examined for plaque formation, calculus deposition and progress of gingivitis once a week for duration of three weeks.	The results showed that brushing with the electric toothbrush over a period of three weeks significantly reduce plaque, calculus and gingivitis index when compared with manual toothbrush.
12.	Manish Jain, Anmol Mathur, Leena Sawla, Geeta Choudhary, Komal Kabra, Prabu Duraiswamy, Suhas Kulkarni Oral health status of mentally disabled subjects in India, <i>Journal of Oral Science</i> . 2009; 51: 3, 333-340. [26].	To determine the oral health status and investigate the association of oral health status with various socio demographic (age, gender, parent's education, income) and clinical variables (etiology of mental disability and IQ level) among mentally disabled subjects.	The study sample comprised of 225 mentally retarded subjects aged 12-30 yrs, caries status, oral hygiene status and periodontal status were assessed by DMFT index, Simplified Oral hygiene index and community periodontal index.	The present study highlighted that the oral health status of mentally retarded population was poor and was influenced by etiology of disability, I.Q level and patient's level of education.
13.	Dinesh Rao, Hegde Amitha, Avatar Kishan Munshi: Oral hygiene status of disabled children and adolescents attending special schools of South Canara, India. <i>Hong Kong Dental Journal</i> 2005; 2: 107-13. [27]	To evaluate the oral hygiene status of disabled children and young adults attending special schools in south canara, karnataka, India.	Disabled individuals between 3 and 20 years attending the district's eight nonresidential special schools were examined by a single investigator between February and April 2002. Oral hygiene levels were assessed using the simplified oral hygiene index, and a modified version of this index was used to evaluate primary dentition. Information regarding tooth cleaning habits was obtained by questioning parents or adult guardians	The study concluded that disabled children experience greater challenges to proper oral hygiene and health care, often due to a lack of basic manual skills and intellectual abilities that precludes adequate practices, such as tooth brushing.
14.	Kharidi Laxman Vandana, Pramod Vinayak Tatuskar, Narayan Narendra Valavalkar: A comparative evaluation of manual and powered brushing on oral health and microbial status of mentally challenged individuals. <i>J Indian Soc Periodontol</i> 2020; 24: 362-8	To assess and compare the effectiveness of manual and powered toothbrush on the oral health and microbial status of mentally challenged individuals.	Thirty individuals of age group 15–30 years with mild to moderate degree of mental retardation were selected. A randomized double-blind split-mouth design with Clinical Phase-i (aided brushing) and Clinical Phase-ii (unaided brushing) with a washout period of 3 days was conducted. The study duration was for 0–45 days. Two types of brushing that is manual and powered brushing were done. The recording of all clinical and microbial parameters were done on 0 <sup>th</sup> day and 21 <sup>st</sup> day while the clinical parameters were recorded up to 45 <sup>th</sup> day.	The study concluded that Powered toothbrush was more effective than manual toothbrush in reducing plaque levels and microbial count in the mentally challenged individuals. The Colgate 360 tooth brush is advisable to mentally challenged individuals.
15.	Shruthi Chandrasekaran, M Dhanraj. Oral Hygiene Status of Mentally Challenged Adolescents in Chennai: A Cross-sectional Study.	The aim of this study was to assess the oral health status of mentally retarded adolescents in Chennai city, Tamil Nadu, India.	Four residential schools housing mentally challenged children were selected for the study, and fifty children were chosen randomly from each school. Informed consent was obtained from the school authorities, local authorities, and parents. The oral hygiene status was evaluated by estimating decayed, missing, filled teeth (DMFT) index, and oral hygiene index (OHI)-simplified. R	The oral hygiene status is poor and inadequate among the mentally challenged adolescents, and hence, meticulous training and awareness programs need to be initiated to address this concern
16.	NT Hashim <sup>1</sup> , B Gobara, I Ghandour. Periodontal Health Status of A Group of (Non- Institutionalized) Mentally Disabled Children in Khartoum State	The aim of this study is to assess the periodontal health status and its determinants among a group of mentally disabled children in Khartoum State and to compare it with a control group of children of normal intelligence.	Thirty seven mentally disabled children aged 8-10 years were examined at five centres of mentally disabled children in Khartoum State. A control group with normal intelligence quotient of a similar age and socioeconomic status was selected from schools nearby the centres visited. Both mentally disabled children and the children in the control group were examined for their plaque index, gingival index and periodontal pocket depth. A comparison was made between the mentally disabled children and the healthy children as well as between the subgroups of the mentally disabled children (mild, moderate, and severe). Questionnaires concerning the degree of mental disability, level of parent education, role of parents toward child oral health, were also used	Mentally disabled children showed more plaque when compared with healthy controls. Periodontal disease was more prevalent among mentally disabled children as presented in the form of gingivitis and the degree of severity depends on the degree of mental disability
17.	Mayuri Vajawat, PC. Deepika <sup>1</sup> , Vijay Kumar, <sup>2</sup> and P. Rajeshwari; A clinicomicrobiological study to evaluate the efficacy of manual and powered toothbrushes among autistic patients	To compare the efficacy of powered toothbrushes in improving gingival health and reducing salivary red complex counts as compared to manual toothbrushes, among autistic individuals.	Forty autistics was selected. Test group received powered toothbrushes, and control group received manual toothbrushes. Plaque index and gingival index were recorded. Unstimulated saliva was collected for analysis of red complex organisms using polymerase chain reaction.	Powered toothbrushes result in a significant overall improvement in gingival health when constant reinforcement of oral hygiene instructions is given.

## Conclusion

The oral health of these groups must be improved and a suitable system devised for delivery of preventive measures. Special consideration must be given to improve the oral health of these groups. Oral health should be included in each child's individual health care plan. Oral health promotion programmes should be aimed specifically at special needs schools and their parents. All these groups should be educated in how to maintain proper oral hygiene. Children should be instructed to clean their teeth twice a day and oral hygiene should be practised at school and supervised by teachers. There should be a provision for in-service training for teachers, school staff and parents on how to promote good oral health specifically for these children with disabilities.

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