EFFECTIVENESS OF BEHAVIOUR GUIDANCE TECHNIQUE & TRAINING PROGRAM FOR CHILDREN WITH AUTISM SPECTRUM DISORDER (ASD) IN MANAGEMENT OF DENTAL DISEASES.

Dissertation

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of

MASTER OF DENTAL SURGERY

In

PEDODONTICS AND PREVENTIVE DENTISTRY

By

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Under the guidance of

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(Faculty of Babu Banarasi Das University)

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S.NO	ABBREVIATIONS	FULL FORM
1.	ASD	Autism Spectrum Disorder
2.	SHCN	Special Health Care Need
3.	CDCP	The Centre For Disease Control and Prevention
4.	CDC	The Centre For Disease Control
5.	PDDNOS	Pervasive Developmental Disorder Not Otherwise Specified
6.	TEACCH	Treatment and Education of Autistic And Related Communication Handicapped Children
7.	ABA	Applied Behavior Analysis
8.	DSM	The Diagnostic and Statistical Manual Of Mental Disorder

Aim: To evaluate the effectiveness of behaviour guidance techniques and training Programmes on Autism Spectrum disorder (ASD) in management of dental diseases.

Materials and method: The present prospective study was conducted including 30 children with autism spectrum disorder aged between 8 to 16 years. Prevalence of Oral health status was checked in children with ASD and further divided under two heads i.e., Group A (control group) without TEACCH approach & Group B (study group) with TEACCH approach for oral evaluation with oral health assessment steps. Children fulfilling the inclusion criteria were enrolled in the study with 15 children in each group out of the total 30 children. These methods were statistically analyzed.

Result: The study result is found to be positive when TEACCH approach is used for the compliance of dental treatment.

Conclusion: The present study may help in establishing the guide for the compliance for dental treatment with TEACCH approach in children with ASD.

'Start by doing what's necessary; then do what's possible; and suddenly you are doing the imposible' - ***Francis of assisi***

The term "autism" is derived from a Greek word "auto" meaning self or same[1]. Jean-Marc-Gaspard Itard was the first person to give description of what may have been an autistic child; in his account of the so-called "Wild Boy of Aveyron''. In 1943, an American child psychologist, Leo Kanner theorised that these children are born with an "innate inability to form the usual, biologically provided effective contact with people"[2]. Simultaneously, an Austrian paediatrician, Dr Hans Asperger described Asperger's syndrome, which was considered the uppermost level of the autism spectrum[3]. Understanding of autism has since evolved and autism spectrum disorders (ASD) have become recognised as a group of lifelong, neurodevelopmental disorders with severe impairment of social reciprocity, communication and behaviour. [4]

In the past, the term autism spectrum disorder (ASD) or pervasive developmental disorders (PDDs) represents a group of disorders which includes five diagnostic subtypes including autism, PDD not otherwise specified (PDD-NOS), Rett's disorder, child disintegrative disorder, and Asperger's disorder. Professionals who specialize in autism have proliferated over the past two decades and have introduced the terminology ASD to reflect the broader spectrum of clinical characteristics that now define autism.[5] ASD are common childhood developmental conditions with impaired communication and social interaction and repetitive behaviour.[4] ASD are biologically based neurodevelopmental disorders that are highly heritable; the exact cause still is unknown. Finding the cause has been daunting due to genetic complexity and phenotypic variation. Based on familial studies of idiopathic ASD, the estimated recurrence risks are approximately 5% to 6%. [6]

Pediatricians play an important role in early recognition of autism spectrum disorders, because they usually are the first point of contact for parents. Parents are now much more aware of the early signs of autism spectrum disorders because of frequent coverage in the media. If their child demonstrates any of the published signs, they will most likely raise their concerns to their child's pediatrician.

The Centre for Disease Control and Prevention (CDCP) estimates that one in 68 children has ASD[7], which means that most dentists will encounter patients with ASD during their careers. It is important for dental professionals to further understand the experiences and challenges encountered by ASD children as they access and engage in oral care both in the home and dental office. Maintaining good oral hygiene in children with autism is a significant task for both the parents or caregivers of the child, and dental staff.

Over the past 20 years, a variety of therapies have been proposed to improve the symptoms associated with ASD. Current treatments include pharmacological therapies and various complementary therapies including diet modifications, vitamin therapy, occupational therapy, speech and language therapy and behavioural and developmental approaches. Interventions that fall within the continuum of behavioural and developmental interventions have become the predominant treatment approach for promoting social, adaptive and behavioural function in children with ASD. These interventions may be viewed in terms of their position on a continuum from highly structured discrete trial training behavioural approaches guided by a therapist, to social pragmatic approaches where teaching follows the child's interests and is embedded in daily activities in a natural environment.

Treatment of autistic and related communication handicapped children (Division TEACCH), has emphasized professionals working together with parents since its inception. TEACCH is to use general characteristics of learning in autism plus highly individualized approaches to help individuals with autism both learn skills and use visual, organizational, and structured adaptations to their environment to function as independently and effectively as possible in society. With the use of images and visual pedagogy based on the TEACCH model, dentists anticipate certain actions to facilitate oral hygiene dental examination and preventive dental treatment.[2]

This dissertation aims at evaluating the effectiveness of guidance and training programmes for children with ASD for prevention and treatment of dental diseases.

AIM:

- To evaluate the effectiveness of behaviour guidance techniques and training programmes for children with Autism Spectrum Disorder (ASD) in management of dental disease.

OBJECTIVES:

- To assess the oral health status and dental treatment needs of autistic children.
- To assess the effects of behaviour guidance techniques and training programmes on the co-operation level of ASD children in management of dental diseases.

Children with Autism Spectrum Disorder (ASD) are the individuals with special needs who pose the greatest challenge for dentists, due to their complex and varied clinical manifestations[39-42]. They may be at an increased risk for oral diseases throughout their lifetime. An individual with autism will have difficulty with three domains: language and communication, socialization, and repetitive behaviours. These impairments have the potential to make oral care difficult in a variety of ways. Stereotypical and repetitive actions can also complicate dentist's ability to safely and effectively provide oral care. They have difficulty in adjusting to changes in their routine & that can make a visit to the dentist challenging. Additionally, behavioural difficulties can create obstacles for the dental practitioner and impact a child's ability to have a successful dental experience. This dissertation aims at evaluating the effectiveness of guidance and training programmes for children with ASD for prevention and treatment of dental diseases and review are as followes :

Ornitz EM, Gutherie D, Farley AH, 1977[9] conducted a study on a sample of 74 young autistic children. Retrospective developmental data on these children with 38 age-matched normal children were gathered by means of a written inventory completed by the parents when the children were relatively young (mean age less than 4 years). The autistic children were reported to have had significant delays in the development of motor abilities, speech, communication, comprehension, and, to a lesser extent, perception during their 1st and 2nd years. **Oslejskoaá et al. (2007)**[10] had reported the mean age at diagnosis for children with ASD is 81.5 months, which represents an average diagnostic delay of 51 months.

Osterling and Dawson, 1994[11] demonstrated autism characteristics in eleven children, following a retrospective viewing of their recorded first birthday parties. These children, who were subsequently diagnosed with autism, were compared with eleven typically developing children. The autistic children demonstrated decreased attraction to the faces of other people and a decreased likelihood to interact with

other people or orientation to name. Although a reported fifty percent of parents have noticed abnormalities in development before the age of one year.

Baranek GT, Foster LG & Berkson G, 1997[12] have stated that such disturbances are more common during infancy and childhood than during adulthood. Studies have shown racial and ethnic differences in ASD diagnostic trends. **Baranek GT, 1999[13]** has concluded that these abnormalities may eventually be useful in early screening.

Caries status in patients with ASD was not related to gender, insurance status or level of parental education, but poor oral hygiene was shown to be the most compelling caries risk indicator. Significantly, this study involved the availability of bitewing radiographs for a high percentage 63%) of participants, which may explain the diagnosis of higher levels of new caries as compared to the study done by **Klein and Nowak, 1999[14].**

Dawson, Osterling J, Meltzoff A and Kuhn P, 2000[15] in their case report of an infant with autism, found that disturbances in sensory processing were apparent during the first year of life. **Dawson G, Watling R, 2000[16]** had said that sensory processing abnormalities were not universal or specific to autism, the prevalence of such abnormalities in autism is relatively high. As abnormal responses to sensory stimuli are found in a substantial subgroup of individuals with autism, with estimates ranging from 30–100%. Such abnormal responses have been found in infants with autism based on observations of home videotapes.

The diagnosis of autism is based on four criteria: onset prior to the age of three, qualitative impairment of social interaction, severe abnormality of communication and restricted, repetitive and stereotypical patterns of behaviour, interests and activities **(American Psychiatric Association, 2000)**[17].

Anthony J. Cuvo, Anna Godard, Rachel Huckfeldt, Ronda DeMattei, 2000[18] conducted a study to evaluate a behavioural package to train children with autism spectrum disorders to be compliant with an 8 component oral assessment. Training procedures were implemented, with a preference assessment, priming DVD, various prompts, stimulus fading (i.e., fading in aversive stimuli), distracting stimuli, escape extinction, and differential reinforcement.

Firoozeh Nilchian, Fereshteh Shakibaei, Zeinab Taghi Jarah, 2017[19] evaluate the impact of visual pedagogy in dental check-ups and preventive practices among children with autism aged 6–12. The selected children were equally divided into two groups of case and control ($n = 20$). The results showed a significant increase in children's cooperation with regard to fluoride therapy in the case group by repeating the visit and training sessions ($p \leq 0.001$). The findings of this study demonstrated that visual pedagogy was merely effective in the case of fluoride therapy in the case group.

Newacheck PW, Hughes DC, Hung YY, Wong S,Stoddard JJ 2000[20] and Yu CA, Dawson G, Munson J, D'souza I, Austerlin J, Stes A et al, 2002[21] stated that out of all the unmet health care needs, unmet dental need is the most prevalent among children in United States. An estimated 50% of adolescents in the general population were reported to lack he recommended number of dental visits[35,36].

The diagnostic and statistical manual of mental disorders (DSM) contains a consensus of signs, disorder progressions, and definitions.[7] **Johnson CP, Myers SM 2007[22]** said that early ASD identification is associated with improved long-term prognosis and family coping with disease. **Mandell DS 2007[23], Mandell DS et al 2005[24], Kataoka SH et al[25], Bornstein MH[26]** have stated that many children meeting diagnostic criteria may be missed in diagnosis or diagnosed years after onset of symptoms and some children speak frequently and in complete sentences; others never learn to speak at all. Some children remain aloof and uninvolved, others are affectionate and interested in interactions with others.

Klin A, 2006[27] stated that the diagnostic signs of autism manifest before the age of three years, but parents usually express concern between the ages of one year to eighteen months. These concerns may involve a fear of deafness, due to lack of response to verbal stimuli, or inappropriate response to normal household sounds, such as the vacuum cleaner. It has been shown that 33% of autistic children demonstrate normal or near normal communication and social skill development in the first one to two years of life, with subsequent regression referred to as "early autistic regression" (**Werner and Dawson, 2005)[28]**.

C. Pilebro, B. Backman (2005)[29] conducted a study to evaluate whether visual pedagogy is a suitable way to teach children with autism to brush their teeth. The investigation took the form of a prospective study including clinical examinations and structured interviews. Based on visual pedagogy, a series of pictures were produced that showed a structured method and technique of tooth brushing. The pictures were placed in the bathroom or wherever tooth brushing was performed. Fourteen children with autism aged between 5 and 13 years and their parents participated. They concluded that Visual pedagogy is a useful tool in helping people with autism to improve their oral hygiene

CDC 2003[30] and Liptak GS, Benzoni LB, Mruzek DW, Nolan KW, Thingwoll MA, Wade CM et al, 2008[31] has prevalence on similar across age, sex, and racial/ethnic populations. It was 3.7 times as high for males as for females, peak prevalence was observed at ages 6-11 years, and lower rates were observed among children of Hispanic ethnicity.

Recent literature has not shown higher levels of dental caries in autistic children compared with the general population. **Cheen Y. Loo, Richard M. Graham, Christopher V. Hughes, 2009[32]** did a study to identify factors associated with the behaviour of patients with ASD in a dental setting, use of general anaesthesia (GA), and protective stabilization. The dental charts of 395 patients with ASD patients and 386 unaffected patients were reviewed. The following data were analysed on ASD diagnosis, age, gender, residence, seizure disorder, additional diagnosis,

medications, caries prevalence and severity, dental treatment history, behaviour and behaviour guidance techniques. Patients with autism, younger age and an additional diagnosis were more uncooperative. Factors associated with the use of GA and protective stabilization in patients with ASD were also identified.

Marshall et at, 2010[33] compared oral health data from 99 children with ASD. They found a high caries history (65%) and rate of novel caries (40%). Caries rate was influenced by ethnicity, with the highest rate of new caries present in children of Asian descent (56%), and the lowest present in children of African American descent (29%), although this was not statistically significant.

Chakrabarti S, Fombonne E, 2001[34] has taken an age (9–10 years) because it is likely that all true cases of ASD, or at least those in whom the condition was causing significant functional impairment, would have come to the attention of health and education services. **Gillespie-Lynch et al, 2012**[35] have stated that, in youth with ASD, there is an association between age and the acquisition of adaptive skills. Similarly, **Lopata et al, 2012**[36] has investigated the correlates of adaptive behaviour in children ages 7–12 with high functioning ASD.

Patients with autism have a lower hygiene level but a comparable caries index when compared with patients without autism. **Bien Lai, Michael Milano, Michael W. R., Stephen R. H, 2011**[37] had done a study by sending questionnaires to 1,500 families from the North Carolina Autism Registry. Multivariate logistic regression analysis was used to determine the significance of unmet dental needs and other predictors.

Of 568 surveys returned (Response Rate = 38%), 555 were complete and usable. Sixty-five (12%) children had unmet dental needs. Of 516 children (93%) who had been to a dentist, 11% still reported unmet needs. The main barriers were child's behaviour, cost, and lack of insurance. The significant predictor variables of unmet needs were child's behaviour, child's dental health, and caregiver's last dental visit greater than 6 months. Type of ASD did not influence having unmet dental needs.

Taryn N. Weil, Robert A. Bagramian, Marita Rohr Inglehart, Dr. Phil. Habil, 2011[38] have stated that concerning problems with communication, it is important to understand as 25–40% of children with ASD do not have verbal communication skills. There were three types of interventions designed to address such abnormalities: sensory integration therapy, traditional occupational therapy, and auditory integration training.

Jaber A, 2011[39] who found a significantly higher decayed, missing or filled teeth score in children with autism compared with age, gender and socioeconomic status matched controls. This study also demonstrated poorer oral hygiene and a lower care index for autistic children. It has been theorized that poor oral hygiene in autistic children may be attributed to the difficulty involved in providing oral hygiene by carers, the child's poor manual dexterity or the detrimental effects of various medications.

According to the prevalence statistics from **Centre of Diseased and Control, 2007**[7] autism spectrum disorder (ASD) is the second most common developmental

disorder. The prevalence rate of autism in 2006 was 1 in 110 children as suggested by **Kotagal and Broomall, 2012**[40] and the prevalence increased to 1 in 88 births by 2012 as estimated by **CDC, 2012**[7]**.** Around 1 in 175 children in Alabama and 1 in 45 children in New Jersey were identified as having an autism spectrum disorder (ASD). Its current prevalence rate estimated by the CDC is 1 in 68 births, or 14.7 children per 1000 stated by **Falco, 2014**[41]**.**

Staal WG, de Krom M and de Jonge MV, 2012[42] conducted a study Educational and behavioral preparation aids such as visual pedagogy, tablets and computer applications, social stories,[43,44] books and pictures series can also be used to describe a situation and designed to prepare a child for a new experience. Despite that, they are relatively inexpensive, easy to administer, and have been shown to be useful in affecting non-dental behavioral changes for up to 60% of ASD children.

Autism is one of the psychological and heterogeneous developmental disorders. **Matson et al., 2012**[45] has described that it as a neuropsychiatric syndrome, derived from the Greek word autos, meaning an isolated self, in which a person keeps himself/herself isolated from the surrounding interactions. There are no known biological causes or markers that define ASD; the condition is diagnosed by clinical signs and symptoms.

Lorena M. Orellana, Sonia Martı ´nez-Sanchis and Francisco J. Silvestre, 2013[46] lead a study to evaluate the effectiveness of a short treatment and education of autistic and related communication-handicapped children-based intervention

program to facilitate oral assessment in children aged 4-9 years and adults aged 19-41 years with autism spectrum disorder. On observation, the TEACCH-based training program was effective in facilitating a full dental assessment by increasing compliance in children and adults with ASD.

Falco in 2014[47] stated that autism is more common in White children compared with African-American or Hispanic children, and boys are five times more prone to ASD compared with girls. Latino children are diagnosed with ASDs 2.5 years later than white children and have more severe symptoms at time of diagnosis**.** Advancing maternal age is related to both genetic and environmental risk factors. Increased rates of chromosomal abnormalities have been associated with older maternal age.[25]

Similarly, **Christensen, bilder DA, Zahorodny W, pettygrove S, Durkil MS and Fitezgerald RD in 2016**[48] have stated that one in every 68 children have ASD, with a higher prevalence in males (4:1 male-to-female ratio). **Roopa Gandhi and Klein U, 2014**[49] stated Over the past decades, the ratio of affected males has remained between 3 and 4:1. Although autism spectrum disorder (ASD) can be reliably detected by age 2, the average age of diagnosis ranges from age 4 to 6, depending on the population said by **Sarabeth Broder-Fingert, Feinverg E and Silverstien M, 2018**[50].

Ebtissam Z. Murshid, **2017**[51] evaluated the effectiveness of a specially designed dental book (preparatory aid) on the behavior of a group of Autism Spectrum

Disorder (ASD) Saudi children during their first dental visit with double-blinded pre-and post-test.

Travis Nelson, Amelia Chim, Barbara L. Sheller, christy M. McKinney, JoAnna M. Scott, 2017[52] conducted a study to evaluated the effectiveness of a dental desensitization program for children with autism spectrum disorder (ASD) and determined characteristics associated with a successful dental examination. By retrospective review of clinical behavioral data and previsit questionnaires for 168 children with ASD who attended a university-based dental desensitization program. The primary outcome was receiving a minimal threshold examination (MTE) while seated in a dental chair. They come to conclusion that Desensitization was effective in achieving an MTE for most children. Those with characteristics consistent of a milder presentation of ASD were more likely to be successful.

Nicole Thomas, Sharon Blake, Christopher Morris, David R. Moles (2017)[53] did a study to gather dental experiences of UK parents of children with autism or working diagnosis of autism and explore how they feel primary care dental services can be improved. A total of 17 parents of children with a diagnosis or working diagnosis of autism took part in semi-structured interviews. It showed a strong relationship between parents and the whole dental team is essential for children with autism to access dental examinations and have satisfactory experience of care.

Rebecca M. Jones, Thaddeus Tarpey, Amarelle Hamo, Caroline Carberry, GijsBrouwer and Catherine Lord, 2018[54] studied that statistical learning-extracting regularities in the environment-may underlie complex social behaviour with 124 children, 56 with autism and 68 typically developing between the ages 2–8 years, completed a novel visual statistical learning task on an iPad. Averaged together, children with autism demonstrated less learning on the task compared to typically developing children. However, multivariate classification analyses characterized individual behaviour patterns, and demonstrated a subset of children with autism had similar learning patterns to typically developing children and that subset of children had less severe autism symptoms. Therefore, it resulted in missing critical heterogeneity. Variability in statistical learning may help to understand differences in autism symptoms across individuals and could be used to tailor and inform treatment decisions.

The present study was conducted in the Department of Pedodontics & Preventive Dentistry, Babu Banarasi Das College of Dental Sciences, Lucknow in collaboration with special schools/institute for autism spectrum disorder after receiving clearance from the Institutional Ethical Committee of BBDCODS, Lucknow. A study was conducted with an aim to evaluate the effectiveness of behaviour guidance technique & training program for children with Autism Spectrum Disorder (ASD) in management of dental diseases.

MATERIALS AND EQUIPMENTS USED:

For examining a patient:

- Mouth mask and diagnostic gloves (Medishield Health Care)
- Stainless steel kidney tray, single sided mouth mirror, probe and tweezers (GDC)

For demonstration and instructions:

- Photograph of dental treatment procedures
- Laptop for diagnostic procedures videos

Inclusion Criteria:

- Subjects belonging to age group of 4-16 years
- Children with Autism Spectrum Disorder

Exclusion Criteria:

- Patients whose parental consent was not obtained

Sample size-

The sample size of the present study was based on pre to during improvement in oral health assessment steps assessed by Frankel behaviour rate scale. It is expected that at least 2% (effect size) higher improvement in TEACCH approach would be seen

as compared to without TEACCH approach. A 5.0% margin of error, 80.0% power and 1:1 ratio is considered. A minimum of sample size of 30 will be required using the following formula:

$$n = \frac{t \times t \times p\,(1-p)}{e^{\wedge 2}}$$

$$= \frac{1.96 \times 1.96 \times 0.02\,(1-0.02)}{0.05^{\wedge 2}}$$

$$= 30.11$$

$$\approx 30$$

where,

n= sample size

t= confidence level of t statistic at 95%, standard value= 1.96

p= effect size= 2%

e= margin of error= 0.05%

Thus, a minimum 30 subjects required for the whole study so 15 for one group.

METHODOLOGY

The present prospective study was conducted including 30 children with autism spectrum disorder aged between 8 to 16 years. After evaluating according to the DSMV criteria; they were randomly selected from different rehabilitation centers and special health institutions. According to envelope randomization technique, children were divided in two groups. Group **A** which was control group having 15 participants, on which behaviour of oral evaluation was done with oral health assessment steps without TEACCH approach. **Group B** was study group with 15

participants, on which behaviour of oral evaluation was done with oral health assessment steps with TEACCH based approach.

1. **Group A** -15 children with ASD
2. **Group B** -15 children with ASD

Data collection:

Data about health, cognitive status and behaviour was obtained by a verbal interactive session with the teachers, supervisors and parents. The gathered information was associated with pathologies, medication. Parents were interviewed about children's ability(tolerance/potential) to remain still for 5 min. Questions included participants past dental history, number of dentists visited and any dental treatment performed/undergone in the past.

Procedure:

The concerned schools and institutes were informed and notified prior to commencement of the study. An informed consent was obtained from each institution, parents and caregivers. Education was given on the importance and maintenance of oral hygiene. The TEACCH approach was described by Dr. Eric Schopler and Dr. Robert Reichler in the 1960s. The TEACCH approach provides the individual with structure and organization. This approach relies on five basic principles; Physical structure refers to the actual layout or surroundings of a person's environment, such as a classroom, home or group home. The emphasis was led on TEACCH approach & its importance as behaviour modification of autistic children.

Parents, instructors and care givers at the schools and institutes were able to carry out specific instructions themselves, to reinforce it to the participants for dental procedures. Evaluation of Participants was done on pre – and during oral assessment test. Each participant was made to sit comfortably on a chair facing the examiner. Primary details of the children behaviour were recorded with frankel behaviour rating scale.

Group A - The behaviour at pre-treatment oral health assessment steps with oral hygiene status was evaluated at the centers/schools and institutes. After pre-

treatment evaluation without implementing TEACCH approach, the participants were taken to the Department of Pedodontics And Preventive Dentistry, BBDCODS. The evaluation of behaviour was done using oral health assessment steps while undertaking the dental procedures. Tell Show Feel Do (TSFD), visual and audio distraction techniques were performed according to the participants needs.

Group B – A total of three visits were made at different intervals in this group. In the first visit, behaviour at pre-treatment oral health assessment steps with oral hygiene status was evaluated at the centers/schools and institutes. After the checkup, they were showed the video of oral assessment steps. In the second and third visits at intervals of one week, the participants were showed the video of oral assessment steps. The parents were asked to show the video every day before their treatment. After 2 weeks, the participants were called for the dental treatment at the Department of Pedodontics And Preventive Dentistry, BBDCODS, Lucknow. The non-invasive dental procedures were done on the participants using different behavioural techniques. The evaluation of assessment steps were also done from the entering the department till the end of dental procedures.

Evaluation of behaviour at Pre-test and During-test

Pre -tests were done in an institution or school room where the participants were familiar with the surrounding. Participants were told that they would have an activity with this person, without specifying anything else. Later each subject was companied by their educator to the room where the test would take place. The dentist was standing/waiting for them at the entry of the room with the pictographic sequence that indicated ‘‘Today in the center the dentist is going to look at your teeth’’. For each of the 10 steps measured in the test, the dentist used simple verbal instructions and positive rewards afterwards. These steps were carried out sequentially and every component was rated as achieved or not.

During test

During- test was done in a specialized room at the Department of Pedodontics And Preventive Dentistry, BBDCODS, Lucknow. The room is equipped with all the instruments for dental treatment. Participants were informed about the dental visits

by their parents at home. 10 step evaluation is done throughout the treatment with behaviour modification technique (TSFD, visual & audio)

Oral assessment steps:

Entering the Room

The subject enters the examination room when the dentist said ‘‘come in’’ alone or accompanied by the educator.

Sitting Down in the Dental Chair

The subject sat down in the chair and remained still for more than 10 s when the dentist said ‘‘sit down in the chair’’.

Lying Back in the Chair

The subject lied back without help and supports their head against the headrest with their legs stretched out or flexed when the dentist said ‘‘lie down in the chair’’

Tolerating Direct Light on the Face

The subject was capable of tolerating the light focused on the chest when the dentist said ‘‘I am going to switch on the light’’. Later it is directed towards the face when the dentist said ‘‘I will put the light on your face’’, while the subject remained lying down.

Opening the Mouth

The subject was able to open the oral cavity to the maximum, maintaining it in this position when the dentist said ‘‘open your mouth’’.

Tolerating Manipulation of the Mouth with Gloves

The subject was capable of allowing the manipulation of the interior of his mouth with the fingers without closing it for intervals of at least 5 s when the dentist said ‘‘open your mouth; I will count your teeth with my fingers’’. Firstly, if necessary, the subject’s fingers were counted with the dentist’s fingers.

Examination with the Mouth Mirror

The subject was able to tolerate the mouth mirror inside the oral cavity, kept it open for intervals of at least 5 s when the dentist said ‘‘open your mouth, I will count your teeth with the mirror’’. Firstly, if necessary, the subject’s fingers were counted with the mirror.

Examination with the Probe

The subject was capable of tolerating the probe inside the oral cavity, kept it open for intervals of at least 5s when the dentist said ‘‘open your mouth; I will count your teeth with the probe’’. Firstly, if necessary, the subject’s fingers were counted with the probe.

Examination with Mirror and Probe

The subject was able to tolerate the mirror and probe inside the oral cavity, kept it open for intervals of at least 5 s when the dentist says ‘‘open your mouth, I will count your teeth with the mirror and the probe’’. Firstly, if necessary, the subject’s fingers were counted with the mirror and probe.

Dental Occlusion

The subject was capable of pressing together the upper and lower teeth for intervals of at least 5 s, allowing manipulation with the fingers without opening the mouth when the dentist said ‘‘press your teeth together and show me them, I will count your teeth with my fingers.”

The present study evaluates effectiveness of behaviour guidance techniques and training programmes for children with Autism Spectrum Disorder (ASD) in management of dental diseases. A total of 30 children with ASD between the age of 8 to 16 years were randomly distributed into two groups and then behaviour was assessed without TEACCH approach (*Group A, n=15*) and with TEACCH approach (*Group B, n=15*) during oral health assessment steps.

The primary measure of the study was assessment of oral health status at the time of diagnosis (enrolment or baseline or pre-treatment). The secondary measure of the study was effectiveness of TEACCH approach, which was assessed by Frankel behaviour rating scale at two levels: pre-treatment and during-treatment. The oral health assessment steps consist of total 10 steps in form of questions and commands.

Statistical analysis

Discrete (categorical) data were summarised in number (n) and percentage (%) and compared by chi-square (χ^2) test. A two-tailed study (α=2) $p<0.05$ was considered statistically significant. Analysis was performed on SPSS software (Windows version 17.0).

OUTCOME MEASURES

TABLE 1- Pre-treatment behaviour of ASD children of both groups.

Group A (N-15)	**Group B (N-15)**	**P value**
Positive-7 (46.6%)	Positive-6(40%)	0.430
Negative-8(53.3%)	Negative-9(60%)	0.506

Before starting the treatment, the behaviour of ASD children was assessed by Frankel behaviour rating scale. In Group A, there were 15 children, out of which 7 were positive and 8 were negative. In Group B, there were 15 children, out of which 6 children were positive and 9 were negative.

Table 2: Oral health status of ASD children

Oral health status	**No. of children(n=30) (%)**
Stain:	
Mild	11 (36.7)
Moderate	10 (33.3)
Severe	5 (16.7)
Good oral hygiene	4 (13.3)
Calculus:	
Mild	12 (40.0)
Moderate	13 (43.3)
Severe	1 (3.3)
Good oral hygiene	4 (13.3)
Malocclusion:	
Class 1	26 (86.7)
Class 2	4 (13.3)
Oral habit:	
Lip biting	3 (10.0)
Mouth breathing	4 (13.3)
Nail biting	1 (3.3)
Nail biting & mouth breathing	2 (6.7)
Tongue thrusting	2 (6.7)
Absence habit	18 (60.0)

Crowding:	
present	2 (6.7)
absent	28 (93.3)
Fracture (no):	
#1	3 (10.0)
#2	2 (6.7)
#3	0
No fracture	25 (83.3)
DMFT INDEX	
D	25
M	25
F	0
Mean DMFT	1.66
Treatment need:	
Oral hygiene instruction only	11 (36.7)
Recommended change of habit	12(40)
Treatment needed: a) oral prophylaxis	25(83.3)
b) restoration	10 (33.3)
Urgent treatment needed	4 (13.3)

Stains and calculus was seen in 86.7% children. Oral prophylaxis was required only in 83.3% children. Class I malocclusion was seen in 86.7% children. Class II malocclusion were present in 13.3 % children while Class III was not seen in any of them.

Various oral habits were found in 40% children which were recommended for treatment. Crowding was only seen in 6.7% children. Trauma could be seen in 16.7% children in terms of Ellis Class I and Class II fracture. Mean DMFT score was 1.66 in which restoration required to be done in 33.3% children. Urgent treatment was sought when children experienced sensitivity or pain leading to restorations or non-invasive procedures.

Table 3: Behaviour of children at Pre- and During- treatment oral health assessment steps in Group A.

Question /commands	Oral health assessment steps	Group A			
		Pre (n=15) (%)	Post (n=15) (%)	chi-square value	p value
Q1.	ENTERING THE ROOM:				
	Negative	10 (66.7)	4 (26.7)	4.82	0.028
	Positive	5 (33.3)	11 (73.3)		
Q2.	SITTING DOWN THE CHAIR:				
	Negative	8 (53.3)	5 (33.3)	1.22	0.269
	Positive	7 (46.7)	10 (66.7)		
Q3.	LYING BACK IN THE CHAIR:				
	Negative	9 (60.0)	3 (20.0)	5.00	0.025
	Positive	6 (40.0)	12 (80.0)		
Q4.	TOLERATING DIRECT LIGHT ON THE FACE:				
	Negative	13 (86.7)	6 (40.0)	7.03	0.008
	Positive	2 (13.3)	9 (60.0)		
Q5.	OPENING THE MOUTH:				
	Negative	6 (40.0)	3 (20.0)	1.43	0.232
	Positive	9 (60.0)	12 (80.0)		
Q6.	TOLERATING MANIPULATION OF THE MOUTH WITH GLOVES:				
	Negative	5 (33.3)	3 (20.0)	0.68	0.409
	Positive	10 (66.7)	12 (80.0)		

Q7.	EXAMINATION WITH THE MOUTH MIRROR: Negative Positive	8 (53.3) 7 (46.7)	5 (33.3) 10 (66.7)	1.22	0.269
Q8.	EXAMINATION WITH THE PROBE: Negative Positive	9 (60.0) 6 (40.0)	6 (40.0) 9 (60.0)	1.20	0.273
Q9.	EXAMINATION WITH MIRROR AND PROBE: Negative Positive	8 (53.3) 7 (46.7)	8 (53.3) 7 (46.7)	0.00	1.000
Q10.	DENTAL OCCLUSION: Negative Positive	5 (33.3) 10 (66.7)	2 (13.3) 13 (86.7)	1.68	0.195
-	Total (**n=150**): Negative Positive	81 (54.0) 69 (46.0)	45 (30.0) 105 (70.0)	17.73	<0.001

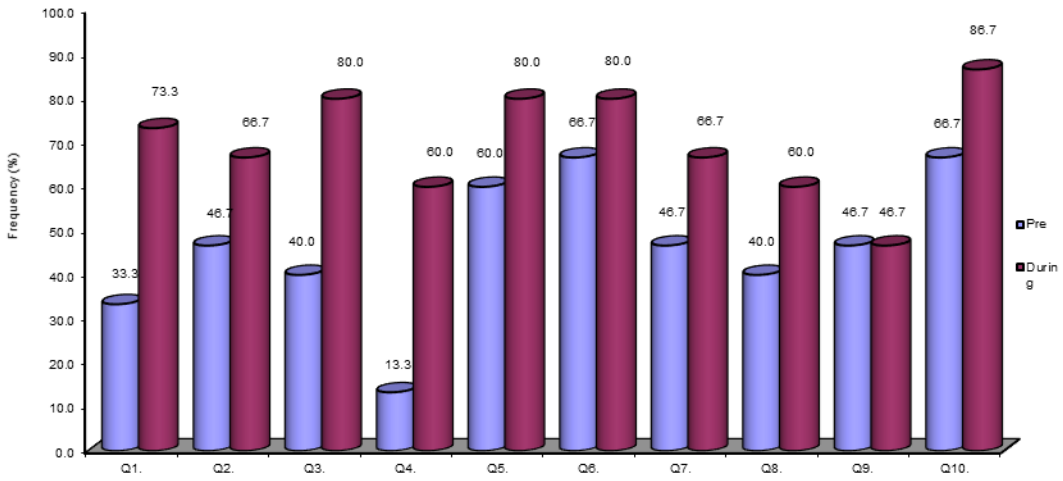

Fig. 1.: Behaviour of children at Pre- and During treatment oral health assessment steps in Group A.

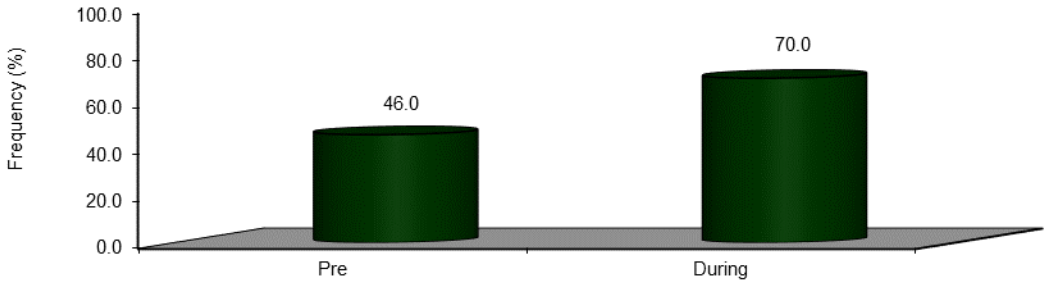

Fig. 2. Overall improvement in behaviour of children at pre- and during treatment oral health assessment steps - Group A.

The pre-treatment and during treatment behaviour during oral health assessment steps (Negative/Positive) of ASD children of Group A was summarised in Table 3. Out of 10 commands, chi-square test showed significant improvement in following three command, **Entering The Room** (33.3% vs. 73.3%, chi-square=4.82, p=0.028), **Lying Back In The Chair** (40.0% vs. 80.0%, chi-square=5.00, p=0.025) and **Tolerating Direct Light On The Face** (13.3% vs. 60.0%, chi-square=7.03, p=0.008) during treatment as compared to pre-treatment respectively (Table 3 and Fig. 1).

However, other seven commands (**Sitting Down the Chair, Opening the Mouth, Tolerating Manipulation of The Mouth with Gloves, Examination with The Mouth Mirror, Examination with The Probe and Dental Occlusion**) showed improvement but were not statistically significant ($p>0.05$).

All 10 commands collectively showed significant improvement in behaviour of children at during treatment as compared to pre-treatment oral health assessment steps (46.0% vs. 70.0%, chi-square=17.73, $p<0.001$) (Table 3 and Fig. 2).

Table 4: Behaviour of children at Pre- and During- treatment oral health assessment steps in Group B.

Question	Oral assessment steps	Group B			
		Pre (n=15) (%)	During (n=15) (%)	chi-square value	p value
Q1.	ENTERING THE ROOM:				
	Negative	10 (66.7)	2 (13.3)	8.89	0.003
	Positive	5 (33.3)	13 (86.7)		
Q2.	SITTING DOWN THE CHAIR:				
	Negative	8 (53.3)	2 (13.3)	5.40	0.020
	Positive	7 (46.7)	13 (86.7)		
Q3.	LYING BACK IN THE CHAIR:				
	Negative	8 (53.3)	1 (6.7)	7.78	0.005
	Positive	7 (46.7)	14 (93.3)		
Q4.	TOLERATING DIRECT LIGHT ON THE FACE:				
	Negative	12 (80.0)	4 (26.7)	8.57	0.003
	Positive	3 (20.0)	11 (73.3)		
Q5.	OPENING THE MOUTH:				
	Negative	9 (60.0)	3 (20.0)	5.00	0.025
	Positive	6 (40.0)	12 (80.0)		
Q6.	TOLERATING MANIPULATION OF THE MOUTH WITH GLOVES:				
	Negative	11 (73.3)	4 (26.7)	6.53	0.011
	Positive	4 (26.7)	11 (73.3)		
Q7.	EXAMINATION WITH THE MOUTH MIRROR:				
	Negative	12 (80.0)	5 (33.3)	6.65	0.010
	Positive	3 (20.0)	10 (66.7)		

Q8.	EXAMINATION WITH THE PROBE: Negative Positive	 13 (86.7) 2 (13.3)	 5 (33.3) 10 (66.7)	8.89	0.003
Q9.	EXAMINATION WITH MIRROR AND PROBE: Negative Positive	11 (73.3) 4 (26.7)	9 (60.0) 6 (40.0)	0.60	0.439
Q10.	DENTAL OCCLUSION: Negative Positive	 8 (53.3) 7 (46.7)	 3 (20.0) 12 (80.0)	3.59	0.058
-	Total (n=150): Negative Positive	 102 (68.0) 48 (32.0)	 38 (25.3) 112 (74.7)	54.86	<0.001

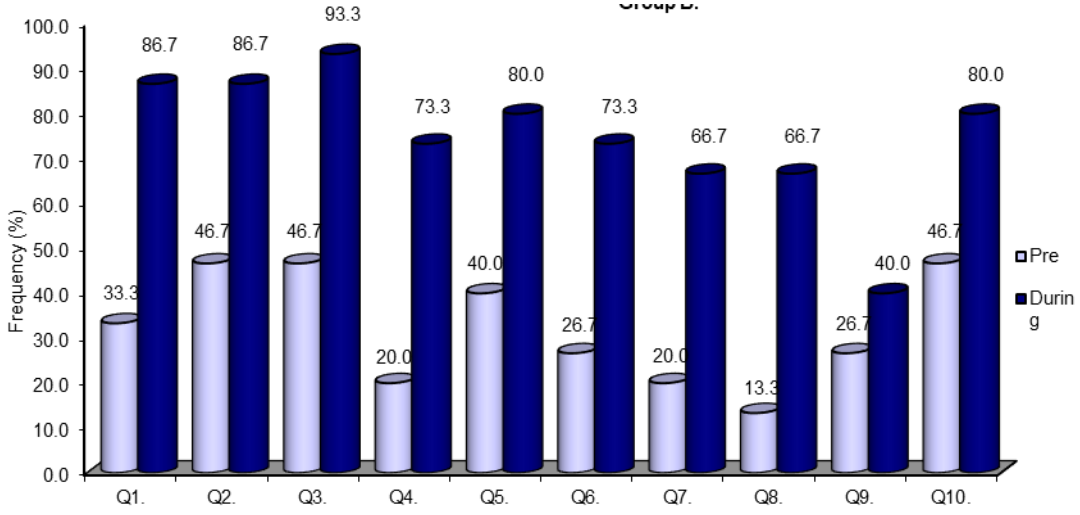

Fig. 3. Behaviour of children at Pre- and During treatment oral health assessment steps in Group B.

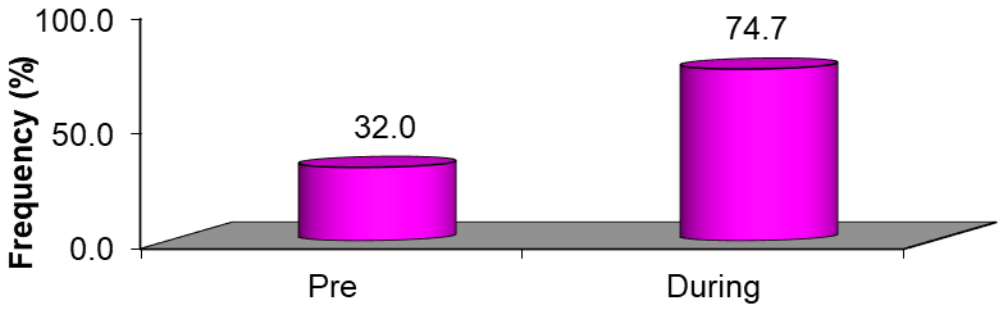

Fig. 4. Overall improvement in behaviour of children at pre- and during treatment oral health assessment steps - Group B.

Pre-treatment to during treatment oral health assessment steps (Negative/Positive behaviour) of ASD children with TEACCH approach in Group B were summarised in Table 4. Out of total 10 commands, chi-square test showed positive significant improvement in eight commands during treatment as compared to pre-treatment (Table 2 and Fig. 3).

In all eight commands, **Entering the room** (33.3% vs. 86.7%, chi-square=8.89, p=0.003), **Examination With The Probe** (13.3% vs. 66.7%, chi-square=8.89, p=0.003) and **Tolerating Direct Light On The Face** (20.0% vs. 73.3%, chi-square=8.57, p=0.003) were better compared to others among them.

The improvements in other commands like **Sitting Down The Chair** (46.7% vs. 86.7%, chi-square=5.40, p=0.020), **Lying Back In The Chair** (46.7% vs. 93.3%, chi-square=7.78, p=0.005), **Opening The Mouth** (40.0% vs. 80.0%, chi-square=5.00, p=0.025**), Tolerating Manipulation Of The Mouth With Gloves** (26.7% vs. 73.3%, chi-square=6.53, p=0.011), **Examination With The Mouth Mirror** (20.0% vs. 66.7%, chi-square=6.65, p=0.010) showed lesser significance of behaviour during treatment as compared to pre-treatment oral health assessment steps (Table 4 and Fig. 3).

Out of all oral health assessment steps (**Examination with Mirror and Probe and Dental Occlusion**) did not show any significant improvement (p>0.05).

The overall behaviour of oral health assessment steps showed significant improvement from pre to during treatment (32.0% vs. 74.7%, chi-square=54.86, p<0.001) (Table 4 and Fig. 4).

Table 5: Comparison of behaviour of children at pre- and during treatment oral health assessment steps in Group A & Group B.

Question/ commands	Oral health assessment steps	Pre (n=15) (%)	During (n=15) (%)	Improvement (%)	Difference (%)	chi-square value	p value
Q1.	ENTERING THE ROOM:						
	Group A	5 (33.3)	11 (73.3)	40.0	13.3	0.05	0.825
	Group B	5 (33.3)	13 (86.7)	53.3			
Q2.	SITTING DOWN THE CHAIR:						
	Group A	7 (46.7)	10 (66.7)	20.0	20.0	0.15	0.700
	Group B	7 (46.7)	13 (86.7)	40.0			
Q3.	LYING BACK IN THE CHAIR:						
	Group A	6 (40.0)	12 (80.0)	40.0	6.7	0.00	1.000
	Group B	7 (46.7)	14 (93.3)	46.7			
Q4.	TOLERATING DIRECT LIGHT ON THE FACE:						
	Group A	2 (13.3)	9 (60.0)	46.7	6.7	0.04	0.840
	Group B	3 (20.0)	11 (73.3)	53.3			
Q5.	OPENING THE MOUTH:						
	Group A	9 (60.0)	12 (80.0)	20.0	20.0	0.37	0.542
	Group B	6 (40.0)	12 (80.0)	40.0			
Q6.	TOLERATING MANIPULATION OF THE MOUTH WITH GLOVES:						
	Group A	10 (66.7)	12 (80.0)	13.3	33.3	1.34	0.247
	Group B	4 (26.7)	11 (73.3)	46.7			
Q7.	EXAMINATION WITH THE MOUTH MIRROR:						
	Group A	7 (46.7)	10 (66.7)	20.0	26.7	1.09	0.297
	Group B	3 (20.0)	10 (66.7)	46.7			
Q8.	EXAMINATION WITH THE PROBE:						
	Group A	6 (40.0)	9 (60.0)	20.0	33.3	1.74	0.187
	Group B	2 (13.3)	10 (66.7)	53.3			
Q9.	EXAMINATION WITH MIRROR AND PROBE:						
	Group A	7 (46.7)	7 (46.7)	0.0	13.3	0.24	0.628
	Group B	4 (26.7)	6 (40.0)	13.3			

Q10.	DENTAL OCCLUSION:						
	Group A	10 (66.7)	13 (86.7)	20.0	13.3	0.19	0.663
	Group B	7 (46.7)	12 (80.0)	33.3			
-	Total (n=150):						
	Group A	69 (46.0)	105 (70.0)	24.0	18.7	3.41	0.064
	Group B	48 (32.0)	112 (74.7)	42.7			

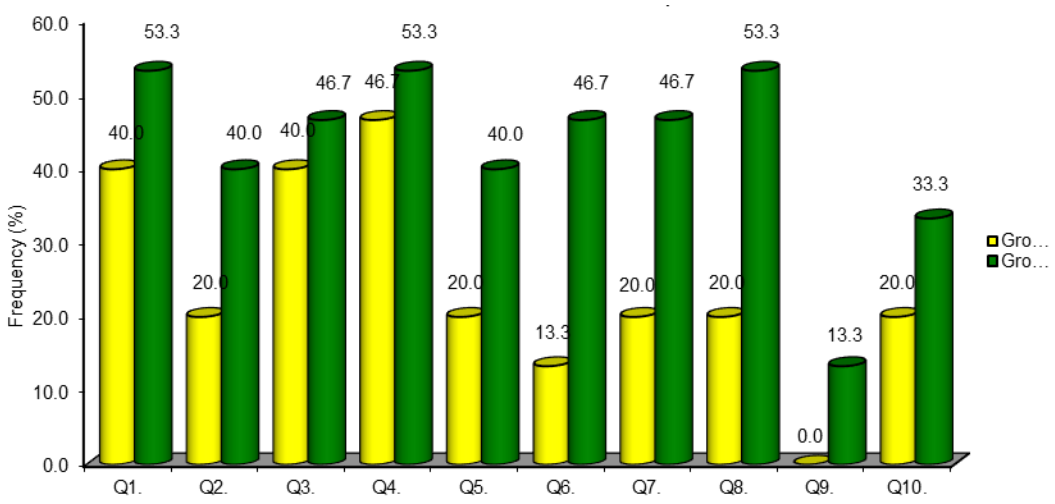

Fig. 5. Comparison of behaviour of children at pre- and during treatment oral health assessment steps in Group A & Group B.

Commencing from Pre -treatment and during treatment, positive improvement in children's behaviour with oral health assessment steps of both groups was summarised in Table 5. On evaluation of 10 commands, Group B showed marked improvement as compared to Group A which are **Entering The Room** 13.3% **, Sitting Down The Chair** 20.0%**, Lying Back In The Chair** 6.7%**, Tolerating Direct Light On The Face** 6.7%**, Opening The Mouth** 20.0%**, Tolerating Manipulation Of The Mouth With Gloves** 33.3%**,, Examination With The Mouth Mirror** 26.7%**, Examination With The Probe** 33.3%**, Examination With Mirror And Probe**13.3% **And Dental Occlusion** 13.3%**.**

However, when comparison was made between Group A and Group B, no statistically significant difference was found (Table 5 and Fig. 5).

Statistical evaluation of the 10 commands included in Group A and Group B was done using chi-square test, its improvement in Group B compared to Group A (24.0% vs. 42.7%, chi-square=3.41, p=0.064). (Table 5 and Fig. 6).

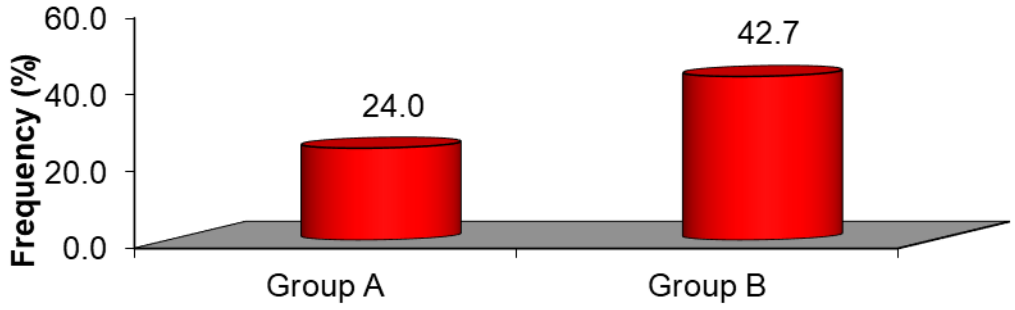

Fig. 6. Overall improvement in behaviour of oral health assessment steps in both groups.Table 6: Distribution of behaviour guidance techniques used for children in Group A and Group B

Behaviour guidance techniques	**Group A (n=15) (%)**	**Group B (n=15) (%)**	**chi-square value**	**P value**
Techniques:				
Audio	1 (6.7)	2 (13.3)	4.73	0.692
Audio + Video	2 (13.3)	3 (20.0)		
TSD	1 (6.7)	0 (0.0)		
TSD + TSFD	1 (6.7)	1 (6.7)		
TSFD	1 (6.7)	3 (20.0)		
TSFD + Audio	0 (0.0)	1 (6.7)		
TSFD + Video	6 (40.0)	3 (20.0)		

Video	3 (20.0)	2 (13.3)		

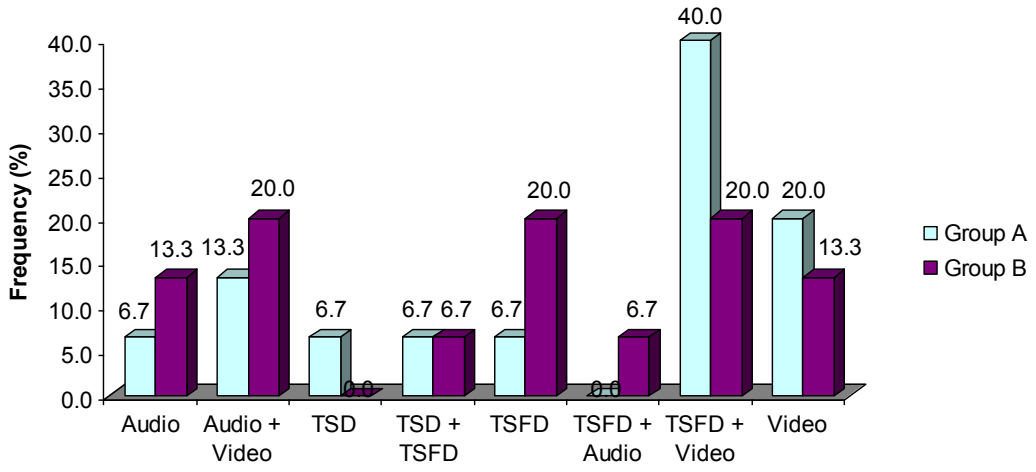

Fig. 7. Distribution of behaviour guidance techniques used for children in Group A and Group B.

The required behaviour guidance techniques applied on ASD children in both groups were summarised in (Table 6 and Fig. 7). There was no statistical difference seen.

ANNEXURE – I

Formula used for the analysis

Chi-square test

The chi-square (chi-square) test is used to compare the categorical data as

$$\chi^2 = \Sigma\Sigma \frac{(Fij - fij)^2}{fij}$$

where, F_{ij} is the observed frequency while f_{ij} the expected frequency. The degrees of freedom (DF) is calculated as

$$DF = (r-1)\,(c-1)$$

Statistical significance

Level of significance "p" is the probability signifies level of significance. The mentioned p in the text indicates the following:

$p>0.05$ - Not significant (ns)

$p<0.05$ - Just significant (*)

$p<0.01$ - Moderate significant (**)

$p<0.001$- Highly significant (***)

The general health condition of individuals with Special Health Care Needs (SHCN) has been reported to be influenced by various sociodemographic factors including living conditions and severity of impairment.[5] Health care for individuals with special needs requires specialized knowledge acquired by additional training, as well as increased awareness, attention, adaptation, and accommodative measures which are beyond what are considered routine[10]. Hence, the dental needs of these individuals should be attended through accurate and appropriate prevention, detection, and treatment.[8]

The effects of disabling conditions are many and varied, but one of the most common effect is inability to maintain oral health. Dental treatment is the greatest unmet health need of an individual with SCHN, this statement by **Nowak**[54] was substantiated globally in his study on special children. SHCN patients may not exhibit the same physical or communicative abilities as their needs are unique and impact their overall health and oral health care.

Lewis et al., 2005[55] conducted a national survey on unmet dental health care needs of children with SHCN and found 78% of children with SHCN as needing dental care in past one year. Out of those, 10.4% of SHCN children did not receive all of dental treatment they needed. **Nelson et al., 2011**[56] targeted a more involved subsample of children with SHCN and reported that 20% had unmet dental needs. Likewise, in Autism Spectrum Disorder (ASD) children, it has also been found that little awareness about the importance of oral health was a contributing factor for high risk of oro-dental diseases. These findings raises particular concerns for children and adolescents with ASD given the potential complexity of their condition.

Children with ASD are the individuals with special needs who pose the greatest challenge for dentists, due to their complex and varied clinical manifestations. They may be at an increased risk for oral diseases throughout their lifetime. An individual with autism will have difficulty with three domains: language and communication, socialization, and repetitive behaviour. These impairments have the potential to make oral care difficult in a variety of ways.[5] Stereotypical and repetitive actions can also complicate the dentist's ability to safely and effectively provide oral care. They also have difficulty in adjusting to changes in their routine which can make their visits to

a dentist even more challenging. Thus, the study was conducted to evaluate the effectiveness of behaviour guidance techniques and training programmes for children with Autism Spectrum Disorder (ASD) in management of dental diseases.

In the present study, behaviour assessment was done through Frankel behavior rating scale. FBRS has been the most frequently used scale in the dental field to evaluate compliance in ASD patients. Similarly, **Klein and Nowak, 1999[14] & Loo CY et al., 2009[32]** used this scale to evaluate behaviour of patients with ASD on their first visit to the dentist. **Harada and Nishino, 2005[57], Loo et al., 2009[32] & Lowe and Jedrychowsky, 1987[58]** used the Frankel scale in dental treatment and evaluated predictors of compliance with dental treatment. Children with ASD may be unable to cooperate in the dental clinic due to their difficulties with social interaction and communication. They resist to changes in their routine which in turn limits them in developing a positive attitude in the dental clinic.

In the present study, evaluation of behaviour of all the children was done in the beginning of the treatment, out of which 53.3% children were positive and 56.6% children showed negative behaviour. **C.Y. Loo et al., 2010[32]** conducted a study on behaviour of children with and without ASD using Frankel behaviour rating scale, in which they found 55.2 % of patients were uncooperative in ASD groups. Similarly, **Marshall et al., 2012[33]** also studied 26 possible determining factors in the level of cooperation of patients with ASD when they faced dental treatment and found that 35% of subjects with autism were cooperative during dental appointments.

The present study was carried out in a total of 30 children aged between 8-16 years. Early intervention and early mind training is less complex since children at this age are at an overall developing age including cognitive development, psychological development and behaviour development. In young adults, individuals reach a stage where brain maturity remains at the same level, therefore young adults post 18 years of age cannot adapt to information. A similar study was carried out by **Chakrabarti S & Fombonne E, 2001[34]** in which they selected an age group of 9–10 years. It is likely that all true cases of ASD or at least those in whom the condition was causing significant functional impairment, would have come to the attention of health and education services by that age. **Gillespie-Lynch et al., 2012[35]** had stated that in youth with ASD there is an association between age and the acquisition of adaptive skills.

Similarly, **Lopata et al., 2012[36]** had selected the age group of 7-12 years as this age finds most correlation in adaptive behaviour with high functioning ASD.

In the present study, evaluation of oral hygiene status of 30 children with ASD was recorded and the results showed that stains & calculus were seen in 86.7% of children. Oral prophylaxis was required for 50% of children with ASD, while oral hygiene instructions were given to all the 86.7 % children. Similarly, **Jaber M. A. et al., 2010[39]** evaluated that 49.1% children had poor, 21.3% fair and 3.2% had good oral hygiene. A study conducted by **Altun et al., 2010[59]** reported that children with ASD had better oral hygiene compared to those with other disabilities. **Suwannee Luppanaporn et al 2010[60]** stated that out of 25 children with ASD, calculus was reported in 16% of children and oral hygiene measures were taken.

In the present study, results showed that 86.1% of children with ASD were diagnosed with Class I malocclusion, 13.3% children were diagnosed with Class II malocclusion while Class III malocclusion was not seen at all. Crowding was seen only in 6.7% children. In a similar study, **Marium S et al.,[61]** reported that 54.8% children had Class I and 17.7% had Class II malocclusion respectively. In a study conducted by **Suwannee Luppanaporn et al., 2010[60]**, 25 children were examined and 37.5% children required treatment for malocclusion.

In the current study, Ellis Class I and Class II fracture was seen in 16.7% children. **Altun et al., 2010[59]** reported Ellis Class I fracture and Ellis Class II fracture in 33% and 22% children respectively.

In the present study, among all the oral habits reported, higher prevelance was present in mouth breathing followed by lip biting and nail biting in children. Similarly, **Al-Sehaibany FS.,2017[62]** found that the most prevalent oral habit was bruxism (54.7%), followed by object biting (44.7%) and mouth breathing (26.7 %). **Kimberly A. and James A., 2000[63]** reported that bruxism is a common habit among children with ASD.

In the present study, few carious lesions were present in most of the children and the mean DMFT score was recorded to be 1.66. The requirement for restorations was 33.3% for ASD children. In contrast, **Lowe and Lindeman, 1997[64]** stated that

patients with autism had a high caries index when compared to patients without autism.[10] **C.Y. Loo et al., 2010[32]** found the caries prevalence to be lower in the ASD group than in the unaffected group. A total of 269 (68.1 percent) patients in the ASD group had a positive dental caries history compared with 332 patients (86.0 percent) in the unaffected group.

The present study aids in assessing the ability of ASD children to comply with the dental environment with TEACCH approach. They were distributed under two heads i.e., Group A (control group) children with ASD, without TEACCH approach & Group B (study group) children with ASD, with TEACCH approach. Children fulfilling the inclusion criteria were enrolled in the study with 15 children in both the groups. The dental examination was conducted in the school. Likewise, **Van Bourgondiën and Coonrod_1989[65]** conducted a study with 34 adults (19-41 years) and 38 children (4-9 years) with ASD, and evaluated the efficacy of TEACCH 5-session training in order to facilitate oral evaluation. The method was proven very efficient for adults and children. 70% of the individuals managed to complete all the steps and 90% managed to reach the penultimate step.

In the present study, ASD children in Group A showed significant improvement of behaviour in three out of ten oral health assessment steps at pre- and during treatment; whereas in Group B, ASD children showed significant improvement of behaviour in eight out of ten oral health assessment steps at pre- and during treatment. Likewise, **Kamen S & Skier J., 1987[66]** said that behavioral compliance is by giving short, clear commands and positive and negative verbal reinforcement. Recorded literature on similar studies comparing pre- and post-test behaviour using Frankel's scale were found to be fewer in number.

In the present study, dental examination was done with the help of a mirror and a explorer. 24% children in Group A and 42% children in Group B showed improved positive behaviour. In a similar study by **Orellana et al., 2014[46]** stated that improved dental assessment after the training protocol was seen and it constituted a real-life outcome measure in a complex condition like dental care setting. Likewise, **Kain et al. 1998[67] & Watson and Visram 2003[68]** stated that familiarizing children

with the dental settings can improve the cooperation among children with challenging behaviours and reduce their anxieties. In the same way, **Gray and Garand 1993[69] & Karkhaneh et al. 2010[70]** conducted a study by preparing and training children with ASD to perform tasks in a systematic step-by-step manner by using visual pedagogies and social stories, which showed a significant improvement in their behaviour. **Panerai et al. 2002[71]** supported the efficacy of TEACCH methods by suggesting that TEACCH is growing programme. **Tsang et al**. **2012[72]** concluded that children subjected to treatment with TEACCH showed a significant improvement in their motor skills and perception capacity.

The improvement in dental assessment after the training protocol constitutes a real-life outcome measure in a complex condition as is a dental care setting. Therefore, the dentist understands these aspects as he is attuned to similar situations and is able to close the communication gap between him and the patient. Once this occurs and complete confidence is gained by the patient, the dentist will discover that performing dental care for the special child is the most satisfying and rewarding experience.

The present study was conducted in collaboration with various residential and day schools for children with Autism Spectrum Disorder (ASD) in the city of Lucknow, Uttar Pradesh. The study was done with an aim to assess oral health status and treatment need in children with ASD and evaluate the effectiveness of behaviour guidance techniques and training programmes for children with ASD in management of dental diseases in children of age 8 to 16 years.

On the basis of observations made during the course of the study and their analysis, the following conclusions have been drawn:

- On oral health evaluation, the most common problem was poor oral hygiene followed by oral habits and dental caries. Class I malocclusion was most common type of malocclusion exhibited by ASD children.
- The most common treatment needs reflected by ASD children were oral prophylaxis followed by oral habit interception and caries management.
- In comparison to non-TEACCH approach, TEACCH approach showed marginally better effectiveness in management of ASD children.

The differentially-abled form a substantial section of the community. Disabling conditions have varied effects, but one of the most common is the inability to maintain oral health. The present study may help in getting a better compliance for oral hygiene status evaluation in children with ASD.

If good oral health is to become a reality, it is of paramount importance that people in constant association with such individuals become involved in their oral care. The oral health care fraternity at large

must actively engage and participate with these sections of the community. In this way, there will be general and social well-being and the affected may enjoy sustained and long-term oral health benefits.

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Fig.1

Fig.2

PRE TREATMENT EVALUATION

Fig.3

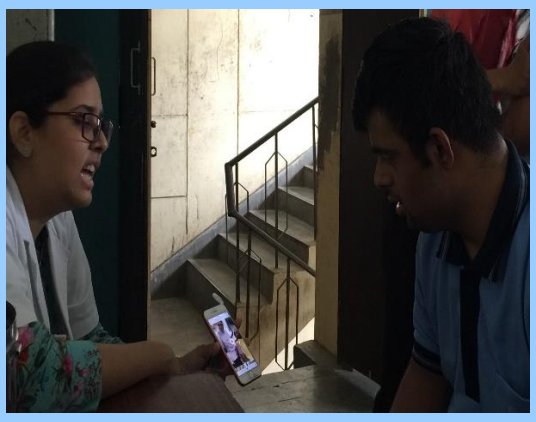

Fig.4

IMPLIMENTING TEACCH APPROACH

PLATE NO. 1

Fig.5

Fig.6

DURING TREATMENT EVALUATION

Fig.7

Fig.8

PLATE NO. 2