Correlation of Self-Injurious Behaviour, Stereotyped Movements and Aggressive/ Destructive Behaviour with Sensory Processing Disorder in Children with Autism and Mental Retardation

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Sensory Processing Disorder, Self-Injurious Behaviour.

Abstract

Aims & Objectives:
1. To correlate self-injurious behaviour, stereotyped movements and aggressive/ destructive behaviour with sensory processing disorder in children with autism and mental retardation.
2. To compare level of self-injurious behaviour, stereotyped movements and aggressive/ destructive behaviour in children with autism and mental retardation.

Method: Study included Group 'A' of 30 children with Autism and Group 'B' of 30 children with Mental Retardation. The parents of these children were asked to complete the Short sensory profile and Behaviour Problem Inventory-01 Questionnaire. The questions in both the assessment tools were explained to the caregiver in most appropriate language. Presence of sensory processing disorder was correlated with frequency and severity of self-injurious behaviour, stereotyped movements and aggressive/destructive behaviour in both the groups.

Results: Results indicate significant and sometimes strong relationship between Short Sensory Profile scores & problem behaviours. Correlation was stronger in children with Autism.

Conclusion: Children with autism showed significant correlation between sensory processing disorder and presence of self injurious behaviour and stereotyped movement. Whereas in children with mental retardation, the correlation was between sensory processing disorder and presence of aggressive/destructive behaviour.

Introduction

“Life is a sensory experience”

During every moment of our life we experience a whole lot of sensory events. In fact the very experience of being human is embedded in the sensory events of everyday life1. Children and adults have characteristic ways of processing sensory information. Sensory processing involves the registration and modulation of sensory information as well as the internal organization of sensory input; it results in successful execution of adaptive responses to situational demands and thus meaningful engagement in daily occupations. However for children with sensory processing disorder (SPD), a group of disorders that involve challenges in modulation, integration, organization and discrimination of sensory input, these differences are extreme and may interfere with daily functioning and emotional-behavioural patterns2.

Ayres (1979) described three aspects of disordered sensory processing that may be found in children with autism and Mental Retardation (MR). First, there is inadequate registration of stimuli, which causes the child to ignore certain relevant aspects of environment. Second, faulty modulation results in perceptual distortions including under and over-activity. Finally, because sensory input fails to trigger positive affective responses, the child avoids novel sensorimotor activities. All these factors influence the child to lack motivation, initiative and self direction in the type of sensorimotor play that is crucial for adaptive learning3.

Children with Autism perceive world differently due to damage to other aspects of sensory system such as inadequate sensory processing and sensory modulation.

The sensory abnormalities have been described in the perception of sound, vision, touch, taste and smell, as well as in kinaesthetic perception and proprioception. They include hypersensitivity...
and hyposensitivity stimulation, with an often unpredictable fluctuation between the two. People with autism who engage in Stereotyped Movements seem “driven” to carry out activity in a certain way. When stereotyped movements are interfered with, the person usually becomes anxious and unhappy which in turn often precipitates a range of problem behaviour⁴.

MR is defined as significantly sub average general intellectual functioning associated with significant deficit or impairment in adaptive functioning, which manifests during the developmental period.

One might possibly assume that not all children with MR will automatically show sensory processing differences. However, in case of general brain damage that affects the intellectual level, it is possible that other brain functions such as sensory modulation will be affected as well.

The problem behaviours (i.e. self- injurious behaviour, stereotyped movements and aggressive/ destructive behaviour) are patterned repetitive movements that share at least three characteristics: a high frequency of repetition, an invariant form and an inappropriate or odd manifestation such that the movement lacks an obvious goal¹. They are most common among children with autism and MR. Within an occupational context, these behaviours limit the capacity of such children to fully participate in the complex occupational performance demands of life that are affected by both environmental and personal factors. Children with a range of disabilities have severe SPDs that cause them to be either over stimulated or under stimulated by the environment. Stereotyped movements may help such children maintain an optimal or homeostatic state of stimulation².

There are studies which support the clinical perspective that problem behaviours are sensory related behaviours that help individual cope with their sensory environment by either generating or avoiding sensory stimulation. They provide support for effectiveness of intervention addressing the underlying mechanism of repetitive movements thereby helping to identify appropriate intervention that will meet the needs of children with sensory differences. Thus this study aims at correlating the self-injurious behaviour, stereotyped movements and aggressive/ destructive behaviour with SPD in children with autism and MR.

**Aims & Objectives**

1. To correlate self-injurious behaviour, stereotyped movements and aggressive/ destructive behaviour with SPD in children with autism and MR.

2. To compare level of self-injurious behaviour stereotyped movements and aggressive/ destructive behaviour in children with autism and MR.

**Methodology**

**Study design**

Non-interventional, cross-sectional, comparative and correlational study

**Inclusion criteria:**

- Children with MR who has I.Q. < 70, tested with Goddard Form Board test and Vineland Social Maturity Scale and diagnosed on basis of DSM-IV-TR criteria.
- Age, 6 through 12 years

**Exclusion criteria:**

- Children associated with any known abnormal metabolism disorder or a specific X-linked gene disorder (e.g. Fragile-X syndrome).
- Children with any orthopaedic disability or neurological deficits (e.g. Cerebral Palsy).

**Test Batteries**

Assessment tools used:-

1. Short Sensory Profile (BSP)
2. Behaviour Problem Inventory- 01(BPI-01)

**SSP (Dunn, 2001)** The SSP is a 38-item caregiver report measure in which the items are scored on a 5-point Likert's scale. Internal validity correlations for the sections ranged from .25 to .76 and were all significant at p < .01. Both section scores and a Total Score are interpreted on the SSP and will be treated as the independent variables. The Total Score is the most sensitive indicator of sensory dysfunction. Given its short administration time (10 min) and value in screening for atypical sensory processing, the SSP is recommended for research protocols. SSP is appropriate for children ages 3-10 years.

**Behaviour problem inventory-01** is a 52-item respondent-based behaviour rating instrument for self-injurious, stereotyped movements and aggressive/ destructive behaviour in MR and other developmental disabilities. Out of 52 items; first 1-15 are self-injurious behaviour items, 16-40 are stereotyped movements and 41-52 are aggressive behaviour items. These 52 items are rated on a frequency scale and a severity scale. Internal consistency of full scale of BPI-01 was 0.81. Reliability of the BPI-01 dichotomous full scale score was 0.76.

**Five-point frequency scale** is scored as

- 0 = never
- 1 = monthly
- 2 = weekly
- 3 = daily
- 4 = hourly

**Four point severity scale**

- 0 = no problem
- 1 = slight problem
- 2 = moderate problem
- 3 = severe problem

**Test Procedure**

Study population was 60 children who were selected from special
schools, state schools and segregated schools. 30 children with Autism were included in group ‘A’ and 30 children with MR were included in group ‘B’. Consent was taken from the parent or the caregiver. The questions in both the assessment tools were explained to the caregiver in most appropriate language. Presence of SPD was then correlated with presence of self-injurious behaviour, stereotyped movements and aggressive/destructive behaviour in both the sub-tests of Behaviour Problem Inventory- 01 i.e. Frequency and Severity. The SPD scores, in children with Autism and MR were also compared. The scores of self-injurious behaviour, stereotyped movements and aggressive/destructive behaviour were compared between children, with autism and MR.

**Graph 1** Distribution according to sex.

![Graph 1](image1)

**Table 2**: Correlation between SSP and SIb in group ‘A’.
Table 3: Correlation between SSP and SM in group ‘A’.
Table 5: Correlation between SSP and SIB in group ‘B’
Optimal functioning in daily environment requires efficient reception and integration of incoming sensory stimuli. 30 children (22 males & 8 female) with Autism and 30 children (19 males & 11 females) with MR, age group 6 through 12 years, were included in group A and group B, respectively.

Incidence of Autism as well as of MR was higher in boys than in girls. 73.3% was the prevalence for boys in autism and 63.3% was for MR (Table 1 & 2, Graph 1). Similar findings were observed in the study done by Scott D. Tomcheck et al and Johannes Rojahn et al. The scales used to assess the sensory issues and the problem behaviours were SSP and Behaviour Problem Inventory-01, respectively.

The frequency and severity components of 3 subscales of BPI-01 i.e. Self-Injurious Behaviour, Stereotypied Movements and Aggressive/Destructive Behaviour were correlated with Section & Total score of SSP. The level of correlation differed for each of the section score and the 3 subscales of BPI-01.

In group ‘A’ (i.e. children with Autism), Score of Sections 4, 6 (i.e. under responsive/ seeks sensation & low energy/weak) and total score of SSP had significant correlation with frequency and severity scores of Self-Injurious behaviour (p = 0.047, p = 0.012, p = 0.013, p = 0.011, p = 0.011, p = 0.030, respectively) whereas score of sections 1, 2, 3, 5, & 7 (i.e. tactile sensitivity, taste & smell sensitivity, auditory filtering and visual auditory sensitivity) did not correlate with frequency and severity scores of self injurious behaviour. (Table 2 & graph 2)

Score of sections 3, 6 (i.e. movement sensitivity & low energy/weak) and total score of SSP had significant correlation with frequency and severity scores of stereotyped movement subscale of BPI-01 (p = 0.013, p = 0.003, p = 0.000, p = 0.001, p = 0.004, p = 0.010) whereas score of sections 1, 2, 4, 5, & 7 did not correlate with frequency and severity scores of stereotyped movements. (Table 3 & graph 3).

In aggressive/destructive behaviour subscale, score of section 4 (i.e. under responsive/sensation seeking) correlated significantly with frequency and severity scores (p = 0.004, p = 0.011) and rest of the section scores did not correlate. (Table 4 & Graph 4)

Most children with autism showed a definite difference in the movement sensitivity, under responsive/sensation seeking and low energy/weak sections of SSP. Significant correlation was noted in total score of SSP with frequency and severity scores of self-injurious behaviour and stereotyped movements. Thus, the results suggest that problem behaviour appear to increase stimulation in an under stimulating environment and thereby help a person to remain within optimal physiological or psychological limits. Sensory processing impairment, thus, represents a mismatch between external contextual demands of child’s environment and his or her internal characteristics. It impairs the ability of the child with autism to sustain engagement with people or in activities. Our results are consistent with the study done by Eynat Gal et al which provides strong evidence for a functional relationship between self stimulatory behaviour and sensory stimulation. Similar results were found in a study done by Yu-Han Chen et al.

Discussion

One of the major concerns for a vast number of people with MR and Developmental Disabilities is a predisposition for serious problem behaviours. Such behaviour sometimes is also referred to as maladaptive, aberrant, challenging or destructive behaviour. Typically it includes various forms of self-mutilation, attacks on others, violent outbursts and stereotypic
In group ‘B’ (i.e. children with MR), section 4 (i.e. under responsive/sensation seeking) correlated with frequency score of self-injurious behaviour (p = 0.025) and severity score of aggressive/destructive behaviour (p = 0.022) (Table 5 & 7, Graph 5 & 7). Total score of SSP correlated significantly with frequency and severity score of aggressive/destructive behaviour (p = 0.049, p = 0.023) (Table 7 & Graph 7). No correlation was found between SSP and stereotyped movement subscale (Table 6 & Graph 6).

The results, thus, indicate that it is not clear that SPD could account for performance of problem behaviour in children with an Intellectual Disability. The case may instead be that the prevalence of problem behaviour among children with an intellectual disability simply indicates that these children’s use of problem behaviour to maintain a homeostatic state reflects their inability to use cognitive resources to cope with new & restricting or frustrating situations. The study, done by Eynat Gal et al, found correlation between sensory issues and problem behaviours in MR, but one third of children with an Intellectual Disability also had Pervasive Developmental Disorder.

Results indicate significant and sometimes strong relationship between SSP scores & problem behaviours. Correlation tended to be strongest in children with Autism.

Children with Autism and MR both performed equally on section and total score of SSP and hence the difference in SP in both the groups was not significant (Table 8 & Graph 8 & 8A).

There is a high degree of occurrence of problem behaviours in both the groups. Subjects with autism exhibited a significantly higher score in frequency and severity of self-injurious behaviour (Table 9 & Graph 9) and stereotyped behaviour (Table 9 & Graph 9A), as compared to MR; but only the frequency (p = .006) and severity (p = .000) scores of Self injurious behaviour were statistically significant. Children with MR had significantly higher level of aggressive and destructive behaviour, as compared to those with autism (Table 9 & Graph 9B).

Our results are consistent with findings of study done by Eynat Gal et al who found that children with autism performed more stereotyped movements than children with any other disabilities like Intellectual Disability. Similar results were found in a study done by James W. Bodfish.

There are two possible explanations for self stimulating behaviours (self-injurious and stereotyped behaviour). The first explanation is that these behaviours are inherently reinforcing by providing tactile, proprioceptive and sensory stimulation to an extent, which is not achieved through conventional adaptive behaviour. An alternate explanation is that self stimulating behaviours are used to help regulate sensory information for people who otherwise have difficulty receiving and interpreting this information.

Children with MR are limited in their ability to explore and interact with their environment which, when combined with initial central nervous system dysfunction, leaves them with some degree of sensory deprivation. This sensory deprivation then leads to breakdown in the central nervous system’s ability to process sensory stimuli and consequently causes “further deprivation, perceptual distortions and stimulus hunger”, which may eventually cause aggressive/destructive behaviour as a way of compensation for the lack of natural, environmental stimulation.

Problem behaviours interfere with participation and engagement in meaningful occupations. These behaviours interfere with an individual’s ability to communicate, learn and interact adaptively with environment and are incompatible with establishment of new skills. Sensory processing problems represent one facet of a broader problem integrating information, which may predispose a child to develop a range of peculiar, maladaptive behaviour. Recognizing these sensory processing contributions as a vital component of the complex developmental presentations of children with autism and MR provides direction for intervention planning and highlights the importance of Occupational Therapy practice in facilitating engagement in occupations. It also helps the therapist to explain the parents about the way, child experiences the world.

Conclusion

Noteworthy findings were observed on correlating problem behaviours with SPD in children with autism and MR. Children with autism showed significant correlation between SPD and presence of self injurious behaviour and stereotyped movement, whereas in children with MR, the findings were suggestive of correlation between SPD and presence of aggressive/destructive behaviour.

Majority of children with autism and MR were reported to have difficulties with processing and responding to sensory input on SSP. Children in both the groups however performed equally on SSP. Hence on comparing their scores for SPD it was not statistically significant.

On comparing, children with Autism exhibited more of Self injurious behaviour and stereotyped movements whereas children with MR exhibited aggressive/destructive behaviour. Statistically significant difference was found only in self injurious behaviour. Thus, we conclude that there is correlation between SPD and problem behaviour in children with Autism and MR.

Limitations

1. Small sample size
2. Sensory responses were considered in the context of behavioural observation via a parent report measure and not in direct observation.
3. Correlation can be done among various other developmental disabilities.

References:

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