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EffectivenessOfAuditoryFeedbackInReducing Toe Walking In Children WithAutismSpectrum Disorder

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Abstract

Thisstudyexplorestheeffectofauditoryfeedback,whichcouldshedlighton variousaspects offunctioningsuchas walking.
Studydesign:-Experimentalstudydesign
Aim:-Tofindouttheeffectivenessofauditoryfeedbackinreducingtoewalkinginchildren withAutismSpectrumDisorder.
Participants:-
50subjectswereselectedofagerangebetween3to8yeardiagnosedwithautismspectrumdisorder.
Methodology:-TheselectedparticipantsweredividedintogroupA(Controlgroup)and group B(experimental group). Administration of outcome measures was donepre-postthrough GoalAttainment scale.
Result:- Thesedescriptivestatisticssuggestatendencyfortoewalkingbeforeauditory feedback was applied. Before the administration of auditory feedback, themean values were 2.84, 2.98, and 2.72 respectively. After administering auditoryfeedback, the mean values for GAS, IRS, and DRS changed to 2.9, 2.56, and 1.18respectively.Post-auditoryfeedbackshowedanimprovementintoewalking.ThePre-Post analysis of the Goal Attainment Scale (GAS) was conducted to evaluate theimpact of auditory feedback on reducing toe walking behavior in children.Initially,during the pre-assessment using GAS, it was observed that children exhibited toewalking behavior. However, after receiving auditory feedback during assessments,therewas anoticeabledecreaseintoewalking.
Conclusion:-Fromtheobtainedresultofthestudyitisobservedthatthereiseffectof an auditory feedback, to reduce toe walking by using auditory squeaking shoesand conventional occupational therapy intervention in children with autism spectrumdisorder.

Keywords:-autismspectrumdisorder,toewalking,auditoryfeedback.

Introduction

Theterm"infantileautism"wasfirstusedtodescribeautismspectrumdisorder(ASD)in1943(AmericanPsychiatricAssociation,2013).Itischaracterizedasthethreepartsofthebodyareaffectedbydevelopmentalproblems.Brain,thesociabilityandempathy-related regions; language, creativity, and verbal exchange adaptability andnarrowinterests.AlthoughtheexactcauseofASDisunknown,thegeneralconsensusis that genetic influences are successful. Over the last half-century, autism spectrumdisorder (ASD) has evolved from a rare, poorly defined disorder with childhood onsetto a well-known, well supported, and extensively researched lifetime condition that isacknowledgedtobebothhighlyheterogeneousandrathercommon.Thoughthereareearly warning signals that can be seen in infancy, the typical age of diagnosis is fiveyears old. Since its initial classification, the essential characteristics of ASD—socialcommunication impairments and repetitive and atypical sensory-motor behaviors—haveremainedlargelyunchanged.

A persistent bilateral toe-to-toe gait pattern is the hallmark of idiopathic toe walking(ITW), a disorder that is diagnosed by ruling out other recognized pathologies. Aftertheageofthree,toewalkingisseenasabnormalinchildrenwhoarenormallygrowing,it may appear with early ambulation. This ailment may manifest as pain in thelegs or feet and frequent tripping or falling. It is reasonable to regard the absence of aheel strike at first contact as a typical variance in the maturation of adult walking. It is criticalforthepractitionertocomprehendthereasonoftheTWduringthechild'sinitialevaluation.Idiopathictoewalkingmaybecausedbyneuropsychiatricconditions,suchasdifficultieswithsensoryormotordevelopment.TWcanbeseenasastageofearlynormal ambulatory development, and in about 80% of kids who can toe walk by thetimetheyaretenyearsold.Additionally,ithasbeendemonstratedthatastrongfamilyhistoryofsensoryprocessingabnormalitiesandautismspectrumdisordersispresent insome children who toe walk.

The use of auditory stimuli as conditional reinforcers to improve proper walking andrival toe walking has been the subject of more recent research. Initially, they usedstimulus-stimulus pairing (e.g., clicking sound) combined with the provision ofadesiredfoodstuff)toCreateaconditionedreinforcerusingthesound.Whileithasbeendemonstrated that using a clicker to deliver auditory feedback will promote properwalking and decrease toe walking, this method is labor-intensive and may be error-prone. Gait retraining has made use of feedback methods such as haptic visual), and auditory When a youngster has a motor control issue, musical stimulation mightprovideinformativeauralinputstimulatethehealingbrain'sneuroplasticitySoundcanstimulate motor neurons and improve muscle timing patterns of activation. Since thebrainprocessesauditoryinformationmorequicklythanvisualinformation,itmaybea viablewayto improvepatientstimulation.

Methods

A total sample of 54 children with ASD. The participant recruited from bridging barriercentregreator Noida west. As per inclusion criteria, Age range between 3 to 8 years,including both male & female, Children diagnose with autism, Children having toewalking behaviour. As per exclusion criteria, Child without any co-morbidity, Childrenhavinganyothermentalhealthdisorder.Childrenwhodonothaveproperdiagnosis.

Datacollection

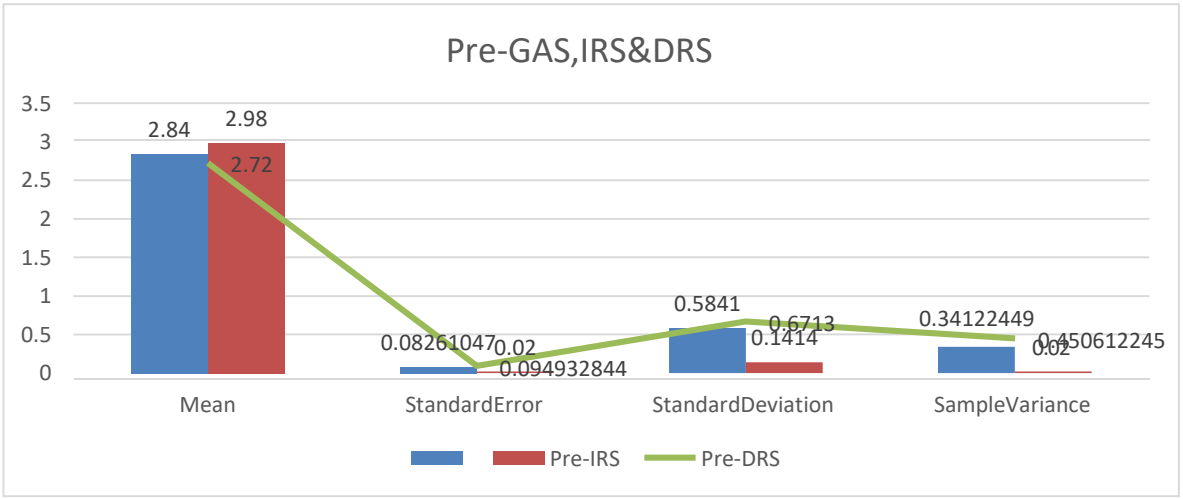
Participantselectedtoconvenientsamplingaccordingtoinclusion&exclusioncriteria,datawascollectedthroughtwophasesforpre&postassessmentinwhichhardcopyofoutcomesmeasuredistributed.Alsocollectedconsentformfromallsubjectsparent ofexperimentalandcontrolgroupwhoareagreetoparticipateinthestudy,demographicdetailswerealsocollectedthroughdatacollectionformthenadministration of scale was given for pre assessment of experimental and controlgroup. After duration of 3 months per week 3 session 45 minutes after administrationthe re-administration of scale was given for post assessment of experimental andcontrol group, and responses were recorded to calculate the pre and post data ofexperimentalandcontrolgroup.Descriptivestatisticswascalculatedandannovawas calculatedforpre andpostanalysis.

Result

Table1.0DescriptiveStatistics

Pre-GAS		*Pre-IRS*	*Pre-DRS*
Mean	2.84	2.98	2.72
StandardError	0.08261	0.02	0.094933
StandardDeviation	0.5841	0.1414	0.6713
SampleVariance	0.341224	0.02	0.450612

Figure1.0Descriptive Statistics



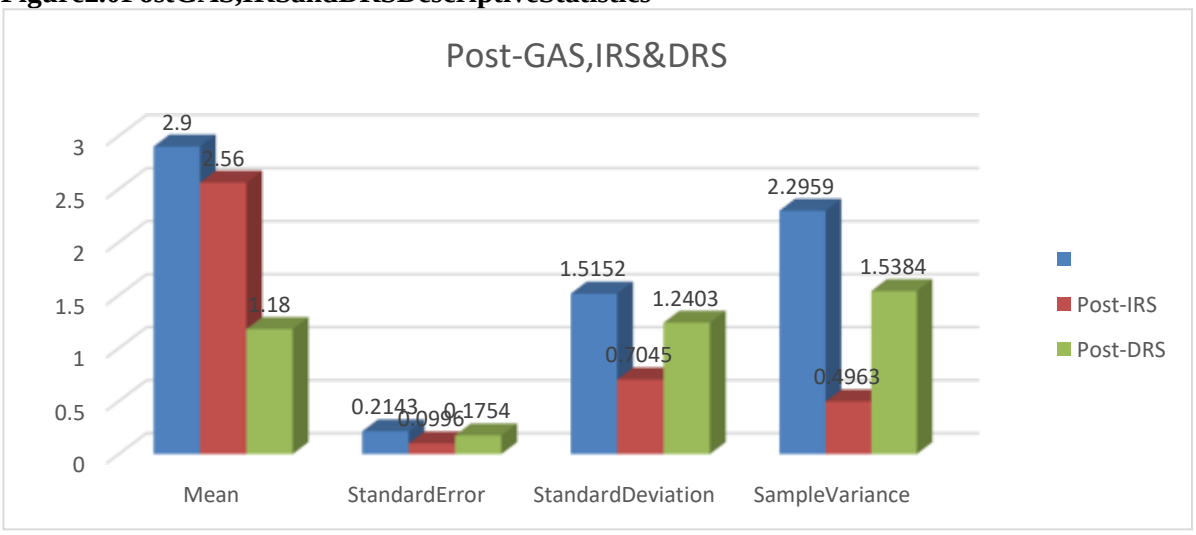
The data presented in Table 1.0 and Figure 1.0 comprises descriptive statistics forPre-GAS, Pre-IRS, and Pre-DRS. The mean values for Pre-GAS, Pre-IRS, and Pre-DRS are recorded as 2.84, 2.98, and 2.72 respectively. Standard errors are providedfor each: Pre-GAS, Pre-IRS, and Pre-DRS. Additionally, standard deviations arereportedas0.5841,0.1414,and0.6713respectively,whilevariancesaredocumented as0.3412,0.02,and0.4506correspondingly.

These descriptivevaluessuggesta propensity towardstoewalking prior totheadministrationofauditoryfeedback.Notably,themeanvalueforGASfallswithinthe+2 category, indicating a heightened expectation for toe walking among the childrenstudied.

Table2.0PostGAS,IRSandDRSDescriptiveStatistics

Post-GAS		*Post-IRS*	*Post-DRS*
Mean	2.9	2.56	1.18
StandardError	0.2143	0.0996	0.1754
StandardDeviation	1.5152	0.7045	1.2403
SampleVariance	2.2959	0.4963	1.5384

Figure2.0PostGAS,IRSandDRSDescriptiveStatistics



The following Table 2.0 and Figure 2.0 present the results of post-auditory feedbackin descriptive statistics. The post-mean values for GAS, IRS, and DRS are 2.9, 2.56,and1.18respectively.Thecorrespondingpost-standarderrorsforGAS,IRS,andDRS are0.2143,0.0996,and0.1754.Post-standarddeviationsforGAS,IRS,andDRSare1.5152, 0.7045, and 1.2403. Sample variances post-values for GAS, IRS, and DRSare 2.2959, 0.4963, and 1.5384. Post-auditory feedback resulted in improved toewalking, as indicated by the post-values of Goal Attainment Scale falling within the +2category. Importance Rating Scale (IRS) post-values indicate a reduction in toewalking, with ratings falling on the 3rd category of the scale. Difficulty Rating Scale(DRS) post-values fall within the +1 category, indicating a reduced difficulty in properwalkingcomparedto pre-auditoryfeedbackconditions.

Discussion:

Themeanvalues,standarderrors,standarddeviations,andvarianceswerecalculatedfor three measures - Pre-GAS, Pre-IRS, and Pre-DRS. Before the administration ofauditory feedback, the mean values were 2.84, 2.98, and 2.72 respectively. Thecorresponding standard errors were provided, along with the standard deviations andvariances.

Thesedescriptivestatisticssuggestatendencyfortoewalkingbeforeauditoryfeedback was applied. Notably, the mean value for Pre-GAS falls within the +2category,indicatingahighexpectationfortoewalkingamongthechildreninthestudy.After administering auditory feedback, the mean values for GAS, IRS, and DRSchanged to 2.9, 2.56, and 1.18 respectively. The post-standard errors, standarddeviations, and variances were also provided. Post-auditory feedback showed animprovement in toe walking, as indicated by the post-values of Goal Attainment Scale fallingwithinthe+2category.TheImportanceRatingScale(IRS)post-valuesindicate a reduction in toe walking, with ratings falling in the 3rd category of the scale.Additionally, the Difficulty Rating Scale (DRS) post-values fell within the +1 category,indicating reduced difficulty in proper walking compared to pre-auditory feedbackconditions.

The p-value calculated between groups was 0.7944, surpassing the conventionalthreshold of significance ($p > 0.05$). Thus, the null hypothesis (H0: Auditory FeedbackHelps to Reduce Toe Walking) is accepted, while the alternative hypothesis (H1:AuditoryFeedbackDoesNotHelptoReduceToeWalking)isrejected.Thisstatisticaloutcome confirms that auditory feedback contributes significantly to the reduction oftoewalking, supportedbythe F criticalvalue.

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