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Research Article

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Role of Allergic Rhinitis in Cognitive Functions and Psychological Condition of Children Aged 8-16 years

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ABSTRACT

Introduction: Allergic rhinitis (AR) is defined as a symptomatic disorder of the nose induced after coming in contact to allergens by an immunoglobulin E(IgE) mediated inflammation. Allergic rhinitis is one of the commonest chronic allergic diseases in school age group. AR is clinically diagnosed and its symptoms are watery nose, nasal obstruction, itching and sneezing.AR is divided into intermittent or persistent disease according to duration of active symptoms. The severity of AR can be classified as mild, moderate or severe according to the level of disturbance of the daily activities. Around 20-30% of the population suffers from AR and the majority of them show symptoms from 6-7 years of age.

Objectives/Aim: To evaluate the role of symptomatic allergic rhinitis in cognitive functioning of a child and the effect of allergic rhinitis on psychological condition of affected children.

Methodology: A prospective observational study was carried out in the OPD/IPD of HI-TECH Medical college and hospital from 1st September 2019-31st October 2021.150 children were evaluated in this period special questionnaire regarding quality of life in rhinitis patients for psychological wellbeing and their cognitive ability like verbal memory, memory retrieval ,working memory ,information processing, colour word interference and cognitive flexibility was evaluated with the help of computerised Visual verbal learning test(VVLT) and Stroop colour word test(SCWT).

Results: In the study we found out that there was a significant association with age in years with working memory/memory retrieval/colour word interference/cognitive flexibility, with p less than 0.05 .The psychological status of children were assessed by the questionaries and was found to be affected due to regular medications leading to inattentive behaviour, absence from school, stress on parents due to high burden of disease, shame because of the persistent nature of the disease and feeling drowsy throughout on medications.

Conclusion: Allergic rhinitis affects the psychological wellbeing of a child and decreases the cognitive ability but there is no cognitive impairment drastically.

Key Words: Allergic rhinitis, cognitive function, psychological condition, visual verbal learning test, Stroop colour word test, questionaries on allergic rhinitis

INTRODUCTION

Allergic rhinitis (AR) is a common chronic disease.[1.] ISAAC phase 1 revealed that in India 12.5% children in the age group of 6-7 years and18.6%in the age group of 13-14 year had nasal symptoms related to allergic rhinitis. ISAAC phase 3 revealed an elevation in nasal symptoms to 12.9% and 23.6 % in 6-7- and 13-14-year age groups respectively.[4] AR is often underestimated. Not only physical manifestations but mental problems, reduce the quality of life (QOL).[6,9] Allergic rhinitis can have negative impact on scholastic performance and work performance which contributes to the experience of stress and agony in children.[3] Children with allergic rhinitis report increased sleep disturbances secondary to allergic symptoms and increased day time fatigue which affects school performance.[5] Michael S Blaiss wrote an article on behalf of the allergic rhinitis in school children consensus group in 2004.[2] The group concluded that allergic rhinitis symptoms can have considerable harmful effects on absenteeism , presenteeism(in attention, distraction, lack of concentration), cognitive impairment(difficulty in use of speech, visual perception and construction, calculationability, information processing and execution etc), poor school performance, behaviour and psychosocial problems in school children.[10] Symptomatic allergic patients are significantly slower in processing a particular data than non-symptomatic patients.[8]Remembering things and making decisions along

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with basic function such as speed directly influences most aspects of daily activities. Consequently, a slow thinking and motor action may impose difficulty on the child in an attempt to maintain a certain performance. This causes fatigue and increased susceptibility to distraction. This increases stress in family system like parent child conflict, parental sleep disruption, increased parenting stress etc. Therefore, it affects both the child and the parents. Now the question arises if cognition and psychosocial well-being is compromised then to what extent.

MATERIALS AND METHODS

This study will be done at Hi-Tech Medical college and hospital Bhubaneswar. The study will cover children aged from 8-16 years. Patient particulars like age, sex, address will be noted. A detailed history including age of onset of illness, duration of illness (seasonal or perineal), family history of atopy, previous anti-allergy treatment and history of scholastic performance will be recorded. Four aspects of cognitive development will be measured. To asses VERBAL MEMORY, Visual Verbal Learning Test (VVLT) will be carried out.15 words will be shown and the child will be asked to remember the words shown to him/her. This procedure will be repeated for 5 times. Number of words recalled immediately shows WORKING MEMORY. Then after 20 minutes, words remembered show long term memory(MEMORY RETRIEVAL). To test information processing of the child, the Stroop-Colour-Word Test (SCWT) will be carried out. Thetest will involve three cards showing colour names(SCWT1), coloured figures (SCWT2) and names of colour written in different coloured ink from the name of the colour it is suggesting (SCWT 3). On the first and second cards, the colour names and figures showing the same colour, no incongruity have to read aloud as quickly as possible, which shows speed of INFORMATION PROCESSING. On the third card, the amount of time required to discard irrelevant but important information (reading of colour name) will be recorded. The difference between SCWT3 and the mean of SCWT1 and SCWT2 will reflect "COLOUR WORD INTERFERNCE", which shows COGNITIVE FLEXIBILITY. The results from above test will be represented using appropriate tables, graphs and diagrams. The psychological condition of the patient will be evaluated using a customised questionnaire.

RESULTS

The below graphs and tables give us the interpretation that allergic rhinitis patients have slower working memory, the memory retrieval is poor and the cognitive flexibility is affected in comparison with normal kids. The significant p value being set as 0.05. But there isn't a major change seen in the children in comparison to non-allergic kids. The affect in psychological domain is far more than the cognitive domain due to various reasons.

Table 1: Age in Years with Memory Retrieval

Crosstab

			MEMORY RETRIEVAL						Total
			4	5	6	7	8	9	
age in years	10	Count	17	0	0	0	0	0	17
		% within age in years	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	11	Count	0	21	0	0	0	0	21
		% within age in years	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	12	Count	0	0	11	0	0	0	11
		% within age in years	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	100.0%
	14	Count	0	0	0	0	27	0	27
		% within age in years	0.0%	0.0%	0.0%	0.0%	100.0%	0.0%	100.0%
	15	Count	0	0	0	16	0	58	74
		% within age in years	0.0%	0.0%	0.0%	21.6%	0.0%	78.4%	100.0%
Total		Count	17	21	11	16	27	58	150
		% within age in years	11.3%	14.0%	7.3%	10.7%	18.0%	38.7%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	600.000[a]	20	.000
Likelihood Ratio	411.261	20	.000
Linear-by-Linear Association	133.187	1	.000
N of Valid Cases	150		

a. 21 cells (70.0%) have expected count less than 5. The minimum expected count is .81.

Table 2: Age in Years with Working Memory

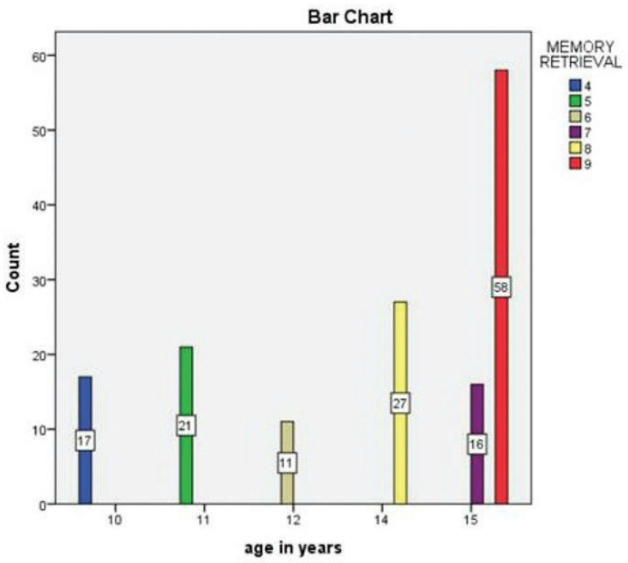
Crosstab

			WORKING MEMORY								Total
			7	8	9	10	11	12	13	15	
age in years	10	Count	0	17	0	0	0	0	0	0	17
		% within age in years	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	11	Count	0	15	6	0	0	0	0	0	21
		% within age in years	0.0%	71.4%	28.6%	0.0%	0.0%	0.0%	0.0%	0.0%	100.0%
	12	Count	0	0	7	4	0	0	0	0	11
		% within age in years	0.0%	0.0%	63.6%	36.4%	0.0%	0.0%	0.0%	0.0%	100.0%
	14	Count	0	0	0	17	0	10	0	0	27
		% within age in years	0.0%	0.0%	0.0%	63.0%	0.0%	37.0%	0.0%	0.0%	100.0%
	15	Count	1	0	0	9	6	0	57	1	74
		% within age in years	1.4%	0.0%	0.0%	12.2%	8.1%	0.0%	77.0%	1.4%	100.0%
Total		Count	1	32	13	30	6	10	57	1	150
		% within age in years	0.7%	21.3%	8.7%	20.0%	4.0%	6.7%	38.0%	0.7%	100.0%

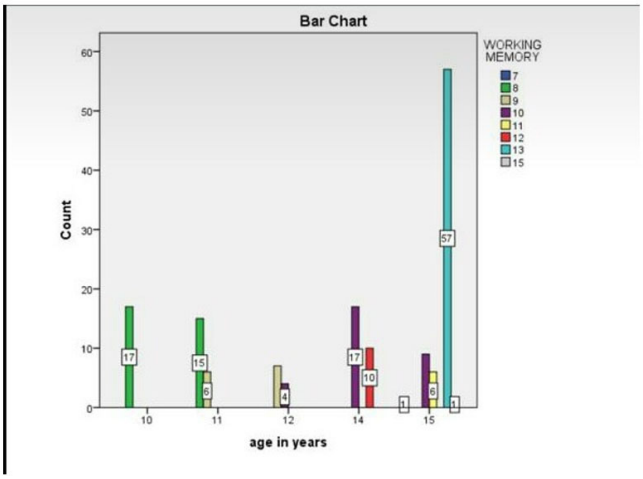
Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	304.666[a]	28	.000
Likelihood Ratio	291.978	28	.000
Linear-by-Linear Association	109.746	1	.000
N of Valid Cases	150		

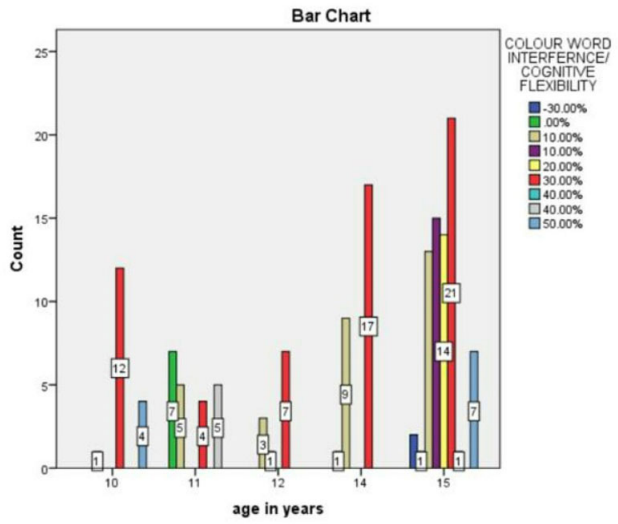
a. 31 cells (77.5%) have expected count less than 5. The minimum expected count is .07.



Graph 1: Age in Years With Memory Retrieval.



Graph 2: Age in Years with Working Memory.



Graph 3: Age in Years with Cognitive Fexibility.

Table 3: Age in Years with Colour Word Interference/ Cognitive Flexibility

Crosstab

			COLOUR WORD INTERFERNCE/ COGNITIVE FLEXIBILITY									Total
			-30.00%	0.00%	10.00%	10.00%	20.00%	30.00%	40.00%	40.00%	50.00%	
age in years	10	Count	0	0	1	0	0	12	0	0	4	17
		% within age in years	0.0%	0.0%	5.9%	0.0%	0.0%	70.6%	0.0%	0.0%	23.5%	100.0%
	11	Count	0	7	5	0	0	4	0	5	0	21
		% within age in years	0.0%	33.3%	23.8%	0.0%	0.0%	19.0%	0.0%	23.8%	0.0%	100.0%
	12	Count	0	0	3	1	0	7	0	0	0	11
		% within age in years	0.0%	0.0%	27.3%	9.1%	0.0%	63.6%	0.0%	0.0%	0.0%	100.0%
	14	Count	0	1	9	0	0	17	0	0	0	27
		% within age in years	0.0%	3.7%	33.3%	0.0%	0.0%	63.0%	0.0%	0.0%	0.0%	100.0%
	15	Count	2	1	13	15	14	21	1	0	7	74
		% within age in years	2.7%	1.4%	17.6%	20.3%	18.9%	28.4%	1.4%	0.0%	9.5%	100.0%
Total		Count	2	9	31	16	14	61	1	5	11	150
		% within age in years	1.3%	6.0%	20.7%	10.7%	9.3%	40.7%	0.7%	3.3%	7.3%	100.0%

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	121.328[a]	32	.000
Likelihood Ratio	113.713	32	.000
Linear-by-Linear Association	3.506	1	.061
N of Valid Cases	150		

a. 36 cells (80.0%) have expected count less than 5. The minimum expected count is .07.

DISCUSSION

Cognitive impairment (also known as intellectual disability) is a term used when an individual has some kind of short comings in mental function and in domains such as communication, self-help and social interaction. These shortcomings will cause a hindrance in learning and development of a child. The affected child will be slow than a typical child. It is diagnosed with the help of standardized tests of intelligence and adaptive behaviour. Children going through cognitive problems such as low attention, poor memory or lack of inhibition may later suffer mental health issues as teenagers and young adults.[7] Allergic rhinitis is one of the major reasons because of which children miss school in childhood days. Due to rhinorrhoea, headache, sleepless nights, difficulty in concentrating, sleeping pattern problems and lethargy, short term memory problems are seen in children. The consequences of symptomatic allergic rhinitis can extend to adult life affecting quality of life in all its aspects. Allergic rhinitis causes emotional problems in children causing them to be depressed and ashamed of oneself, hence decreasing their performance in school.

CONCLUSION

Symptomatic allergic rhinitis disturbs day to day life due to signs and symptoms experienced and due to grave impact on mental health. Some investigations and tests have been run to gauge the effect on cognitive functions objectively. But it still remains uncertain if it leads to an objective reduction in cognitive functions of the affected child. The psychological condition of the affected patients was significantly impaired.

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DR MANISHA PATRO: Drafting of the first manuscript

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