Comparison Of Children At-Risk For Auditory Processing Disorder Between Urban And Rural Schools

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Abstract

Aim: The aim of the study was to compare the number of children at-risk for APD in rural and urban government schools and determine the link between at-risk for APD and family literacy / educational support. Additionally, the study compared the knowledge teachers have regarding APD across rural and urban government schools.

Methods: The study was carried out in three phases. In the first phase, two different questionnaires were developed, one related to teachers' knowledge of APD, and the other related to family literacy and educational support provided to the children at home. The second phase involved evaluation of knowledge regarding APD from 92 teachers (37 teachers from rural & 55 teachers from urban schools). In the third phase, 2029 primary school-going children from rural (N = 899) and urban (N = 1130) government schools were screened using the Screening Checklist for Auditory Processing (Yathiraj & Mascarenhas, 2003, 2004. The children were classified into 4 ages groups. Information on family literacy and educational support provided at home for all the participants were obtained from the teachers.

Results: A significantly higher number of children were found to be at-risk for APD in rural government schools than in the urban government schools. In the urban schools, across different age groups, a significant difference in number of children at-risk for APD was noted. No such difference was observed in the rural schools. Further, a significant negative correlation was seen between educational support / family literacy and SCAP scores, with it being moderate in rural schools and weak in urban schools. Additionally, family literacy and educational support were found to be higher in rural schools than urban schools in children who were not at-risk for APD. However, in children at-risk for APD, educational support was observed to be more in rural than urban schools but family literacy was similar across both locations. Also, teachers in rural schools were found to have more knowledge of APD when compared to teachers in urban schools. A significant negative moderate correlation was found between years of experience and knowledge of APD in teachers from rural schools. However, no such difference was noticed in urban school-teachers.

Conclusions: The study indicated that the number of children at-risk for APD varied across rural and urban government schools. Family literacy and educational support given to children at home may influence the presence of symptoms of APD present in children. It needs to be further evaluated whether symptoms of APD influence the educational outcome of children in schools.

Key words: *Risk for APD, Knowledge of APD in teachers, Educational support, Family literacy*

Introduction

Education is known to be of paramount importance in moulding the personality and confidence of individuals. It has been considered essential for an individual to succeed in life (McKay, 2015). Studies carried out in India indicate that the dropout of children from schools varies depending on the region. Across the states of India as well as across districts within a state, the dropout varies. It has also been shown that the number of children educated in rural and urban areas varies. The dropout rate has been also seen to vary depending on the grade in which children study (Chigari, Angolkar, Sharma, Faith, & Kumar, 2015; Gouda & Sekher, 2014; Minz, Jain, Soni, & Ekka, 2015; National Sample Survey Organisation, 2014; Sarva Shiksha Abhiyan, 2013; Sarva Shikshana Abhiyan Karnataka, 2010).

National level studies conducted in India indicate that the dropout rate in schools ranges from 2.54% to 13.7% (Census of India, 2011; Gouda & Sekher, 2014; National Sample Survey Organisation, 2014; Pratham Education Foundation, 2013; Sarva Shikshana Abhiyan Karnataka, 2010, 2013). This dropout rate has been noted to be higher in rural areas compared to urban areas (Gouda & Sekher, 2014; National Sample Survey Organisation, 2014; Sarva Shikshana Abhiyan Karnataka, 2010, 2013). Additionally, it has also been seen that the dropout is more in higher grades compared to lower grades (Chigari et al., 2015; Minz et al., 2015; Sarva Shiksha Abhiyan, 2013).

Christle, Jolivette, and Nelson (2007) observed a strong relation between academic achievement and school dropout rates. Several reasons have been attributed for children dropping out of school. Studies carried out India reported poor academic performance, lack of interest in studies and repeated failures as major contributing factors for school dropouts (Chigari et al., 2015; Gouda & Sekher, 2014; Govindaraju & Venkatesan, 2010; Minz et al., 2015; National Sample Survey Organisation, 2014; Patil & Malagi, 2013;

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Pratinidhi, Kurulkar, Garad, & Dala, 1992; Sarva Shiksha Abhiyan, 2013). In addition to it, factors like low socioeconomic status, literacy of the parents and domestic duties were also found to result in school dropouts (Chigari et al., 2015; Malik, Biswas, Mitra, & Chaudhury, 2002; Minz et al., 2015; Pratinidhi et al., 1992; Sarva Shiksha Abhiyan, 2013). Thus, it can be noted that the majority of reports in India observe poor academic performance to be a factor for children dropping out of school.

Studies speculate that auditory processing disorder (APD) could negatively influence the academic achievement of children (Bellis, 1996; Bellis & Ferre, 1999; Rosen, Cohen, & Vanniasegaram, 2010). Hus (1997) reported that APD is frequently diagnosed in children who have problems in pursuing their studies, despite having normal hearing and cognitive abilities. Further, the presence of difficulties in language and reading abilities has been observed in children having APD (Cacace & McFarland, 1998; Katz, 1994; Sharma, Purdy, & Kelly, 2009; Wit et al., 2016).

Additionally, western studies indicate that the prevalence of APD in school-going children is 2 to 5% (Chermak & Musiek, 1997; Silman, Silverman, & Emmer, 2000). Additionally, the ratio of APD was observed to be 2:1 among boys and girls (Chermak & Musiek, 1997). Further, Muthuselvi and Yathiraj (2008-09) found 3.2% of school-going children to be at-risk for APD in India.

The review of literature indicates that a large number of children in India are at-risk for APD (Muthuselvi & Yathiraj, 2008-09). Additionally, surveys carried out in India report that a large number of children drop out of school (National Sample Survey Organisation, 1998, 2014; Reddy & Sinha, 2010; Sarva Shiksha Abhiyan, 2013). Although this percentage has been reported to have reduced over the years, it still continues to be high. Several reports in India maintain that the dropout rate is higher in rural schools compared to urban schools. However, none of the studies have evaluated whether there exists a difference in the number of children at-risk for APD in rural and urban schools. Hence, this needs to be determined as it is possible that there may be a link between dropout rate of school children and APD.

Further, it needs to be evaluated if there is a link between the presence of symptoms of APD in children and aspects that are known to aid in academic performance. These aspects include literacy level of the family, the educational support received by children as well as knowledge of teachers regarding APD. Information on whether these aspects differ in rural and urban schools will shed light on the possibility of them having an association with APD. This will enable taking necessary steps so that appropriate remedial measures can be provided. Thus, the study aimed to compare children who are at-risk for Auditory Processing Disorder in rural and urban schools. Additionally, the study aimed to compare the literacy level of the family and educational support received by children as well as the knowledge of the teachers regarding auditory processing in rural and urban schools.

Methods

The study was carried out as a survey in three phases. The first phase involved the development of questionnaires to determine the knowledge of school teachers regarding auditory processing disorder as well as determine information about the educational background of the family and educational support given to the children. The second phase entailed the assessment of the knowledge of teachers regarding auditory processing disorder. The third phase involved administration of the 'Screening Checklist for Auditory Processing' (SCAP; Yathiraj and Mascarenhas, 2003, 2004) by school teachers.

Participants

In Phase 1 of the study, 10 professionals consisting of 5 audiologists and 5 special educators were involved in content validation of the questionnaires that were developed. In Phase 2, evaluation of knowledge of regarding APD was obtained from 92 teachers from 5 different rural government primary schools and 5 different urban government primary schools. Among the 92 teachers, 37 taught in the rural schools and 55 taught in the urban schools. The educational qualification of the teachers was either Diploma in Education or Bachelors in Education. Only those with a minimum experience of one year in teaching were selected for the study. Further, only teachers who taught curricular subjects to the children they were reporting about in Phase 3 of the study were selected.

In Phase 3 of the study, 2029 primary school-going children in the age range of ? 7 to < 11 years were screened using SCAP. Among them, 899 studied in five different rural government primary schools and 1130 studied in five different urban government primary schools . The schools were randomly selected within rural and urban locations. The children were also chosen randomly from grade 2 to grade 5 in both set-ups. Further, the children were classified into four age groups. Group 1 had 461 children aged ? 7 to < 8 years; Group 2 consisted of 447 children aged ? 8 to < 9 years; Group 3 consisted of 551 children aged ? 9 to < 10 years; and Group 4 consisted of 570 children aged ? 10 to < 11 years. It was ensured that none of the children had peripheral hearing loss or history of language impairment. Children who shifted schools from a rural to urban set-up or vice versa were excluded from the study.

Test Environment

The screening of the children was done in quiet, well illuminated rooms within the premises of the schools located in urban and rural areas. The schools were categorized as urban and rural based on the definition provided by Census Bureau (2011). Using convenience sampling, five government primary schools in Mysuru urban area and five government primary schools from Gundlepet rural area were selected for the study. The rooms selected within the schools were away from major sources of noise within the school and the doors and windows were shut to reduce interference of noise. Additionally, the rooms were free from visual distractions.

Instrumentation

A calibrated Oto Read OAE analyser with facility to carry out Distortion Product Oto Acoustic Emission (DPOAE) was used to rule out peripheral hearing problem. An otoscope (Specula mini 3000) was used for visual inspection of the ear.

Material

SCAP, developed by Yathiraj and Mascarenhas (2003, 2004) was used to screen the children for the presence of APD. It consisted of 12 questions that obtained information regarding the auditory perceptual abilities, auditory memory and other related symptoms.

Two questionnaires were developed as a part of the study. The first was developed to assess the knowledge of teachers regarding auditory processing disorder. The second was developed to obtain information regarding the educational background of the family and educational support given to children.

Phase 1: Development of questionnaires

The questionnaire regarding 'Knowledge of school teachers regarding APD' was designed to tap information on two major domains, (a) knowledge about signs and symptoms of APD, and (b) measures to be taken for children with signs and symptoms of APD. The questions were framed based on information available in literature as well as the knowledge of professionals working in the area of APD.

Content validity of the developed questionnaire was done using five audiologists who had experience in the area APD for at least 5 years. The audiologists were requested to indicate whether the questions elicited information regarding knowledge of teachers about APD as well as the appropriateness of questions for the domain under which they were listed. They were also required to comment about the scores assigned to the questions. The questions and scores that were considered appropriate by 80% of the audiologists were retained and the remaining were deleted/modified. Thus, the final version of the questionnaire consisted of 7 questions regarding the knowledge about signs and symptoms of APD (1st domain) and 1question with 12 options regarding measures to be taken by teachers in case children show signs and symptoms of APD (2nd domain). All questions required Yes/ No answers and every correct answer was assigned a score of 1 and 0 for every wrong answer. The maximum possible correct score was 19.

The questionnaire on the Family literacy and educational support provided to children was designed to elicit information regarding demographic details and general information of the family (1st domain). Additionally, information regarding educational background of the family (2nd domain) and educational support received by a child (3rd domain) was obtained. The questions under each domain were selected based on input of professionals.

The content validity of the developed questionnaire was established with the assistance of 5 special educators who were not involved in the initial development. They were requested to indicate whether the domains, questions, and scoring were appropriate. Only responses that were considered appropriate by 80% of the special educators were retained in the final questionnaire. The final questionnaire consisted of 12 questions that were designed to elicit appropriate information regarding demographic details and other general information of the family (1st domain), educational background of the family (2nd domain) and educational support given to a child (3rd domain). The 1st domain consisted of 4 questions that included demographic details and 2nd and 3rd domains encompassed of 2 questions in each domain along with subsections. The maximum possible score was 28.

Translation of questionnaires from English to Kannada was done by a native speaker of Kannada who was fluent in both languages. Two others who were also fluent in both Kannada and English were required to carry out a reverse translation of the Kannada questions to English. The Kannada translation was considered appropriate as the reverse translation captured the essence of the information being conveyed.

Procedure

The study was conducted abiding to the guidelines provided in the Ethical Guidelines for Bio-Behavioural Research Involving Human Subjects (2009) of All India Institute of Speech and Hearing. Prior to carrying out the study, permission was also taken from the Deputy Director for Public Instruction of both Mysuru and Chamarajanagar districts for evaluating the participants. The former was in charge of Mysuru and the latter in charge of Gundlepet.

Phase 2: Procedure for evaluation of knowledge of teachers regarding APD

A cross sectional survey was carried out in the 5 rural primary government schools located in Chamarajanagara district and 5 urban primary government schools located in Mysuru district to assess the knowledge of teachers regarding APD. Teachers from the rural schools (N = 37) and urban schools (N = 55) were independently informed about the purpose of the study prior to administering the developed questionnaire. They were also briefed about how to answer the questionnaire. The 92 teaches who were evaluated excluded 2 teachers from an urban school who were unwilling to answer the questionnaire. The teachers who participated in the study were not allowed to discuss with other teachers while answering the questions, to avoid one participant biasing another.

Using the developed scoring procedure, the responses of the participants were scored. A maximum correct score of 7 and 11 were given to first and second domain respectively. For each participant, the total score was calculated and tabulated.

Phase 3: Procedure for screening for APD and obtaining information regarding family literacy and educational support provided to children

Prior to screening for APD, to rule out the presence of any peripheral hearing loss, 899 children studying in rural schools and 1130 children studying in urban schools were screened. A visual inspection of the ear as well as screening OAE was carried out for all the children. The visual inspected was done using an otoscope to rule out the presence of impacted wax, foreign object in the canal and other visible anomalies that may cause hearing problem. In children who had clear ear canals, DPOAEs were recorded for four frequencies (500 Hz, 1000 Hz, 2000 Hz, & 4000 Hz) in both the ears at 65 dB peak SPL (L1) and 55 dB peak SPL (L2) with an f2:f1 ratio of 1.22 : 1. The children were labeled as 'Pass' or 'Refer' automatically by the instrument. The OAE testing was repeated in those participants who were categorised as 'refer' in order to confirm the interpretation. Those (N = 11; 7 from rural and 4 from urban setups) who continued to be categorised as 'refer' were recommended to undergo detailed evaluation at an audiological centre and were eliminated from the rest of the study.

Those who passed the visual inspection and OAE screening were screened for the presence of APD using SCAP. The school teachers who taught curricular subjects and had a minimum of one year of experience teaching the children were instructed to answer SCAP. The same teachers were also instructed to answer the questionnaire on Family literacy and educational support provided to children. Prior to administration of the checklist / questionnaire, the teachers were instructed as to how they were expected to answer the tools. SCAP was scored as per the recommendations of Yathiraj and Mascarenhas (2003, 2004).

Test-Retest Reliability

Test-retest reliability was done on 5% (N = 100) of the children by requesting teachers to answer SCAP as well as the questionnaire 'Family literacy and educational support provided to children' again. Re-administration of all the above was done within a month's interval.

Analyses

The obtained data were tabulated and analysed using SPSS (version 17) and Smiths Statistical Package. Kolmogorov-Smirnov test of normality was used to check the normality of the obtained sample from children in rural and urban setups. As the scores were not normally distributed, non-parametric statistics was used. Both descriptive and inferential statistical analyses were done. Mann Whitney U test was done to determine the differences across groups of children who were 'not at-risk' and 'at-risk' for APD between rural and urban schools. A two-sample ztest for equality of proportions was administered by using Smiths Statistical Package to compare the number of children who were at-risk for APD between rural and urban schools. Further, a Spearman's correlation was done to find the effect literacy level of the family as well as of educational support provided to the children on SCAP scores.

Additionally, prior to analyzing the data regarding the knowledge of teachers regarding APD, a Shapiro Wilk test of normality was done. As the obtained data were normally distributed, parametric statistics was used. An independent two sample t-test was used to compare the knowledge of teachers regarding APD between the rural and urban setups. A Pearson's correlation test was used to study the effect of number of years of experience of the teachers with the scores obtained by them on the questionnaire assessing their knowledge of APD.

Results

The data obtained from the teachers regarding children studying in rural and urban setups were analysed using SPSS (Version 17) to compare the number of children who are at-risk for APD in the two locations (urban & rural schools). The data were also analysed to find the effect of family literacy and educational support given to children on risk for APD children studying in rural and urban schools. Additionally, the data were analysed to compare the knowledge of teachers regarding APD in rural and urban schools.

Comparison of number of children who are at-risk for APD across rural and urban setups

In the rural school, a total of 132 (14.68%) children out of 899 children were found to be at-risk for APD as per the SCAP scores. On the other hand, in the urban school,

113 (10%) out of 1130 children were found to be at-risk for APD. The percentage of children at-risk for APD was higher in the rural schools compared to the urban schools in all four age groups that were studied (Table 1). In order to compare the number of children at-risk for APD between rural and urban schools, a two-sample z test for equality of proportions was used. This was carried out by using Smiths Statistical Package software. The result of the test indicated that there was a significant difference ($z = 3.21$, $p < 0.01$, two-tailed) between the proportion of children at-risk for APD in rural and urban schools, with it being larger in the children studying in rural set-up.

Comparison of number of children who are at-risk for APD across the age groups within rural and urban setups

The number and percentage of children at-risk for APD in each of the age groups (≥7 to < 8 years, ≥8 to < 9 years, ≥ 9 to < 10 years, & ? 10 to < 11 years) is provided in Table 1. This is provided separately for the children studying in rural schools and children studying in urban schools. From the table it can be seen that in the rural schools, the percentage of children at-risk for APD was highest in the youngest age group, while the percentage was similar in the older three age groups. However, in the urban schools, the younger two age groups had a higher percentage of children at-risk for APD compared to the older two age groups.

In order to determine whether there was a statistical significant difference between the four age groups in each of educational locations, a two-sample z test for equality of proportions was used (Table 2). No significant difference was observed across the four age groups of children studying in rural schools. On the other hand, significant differences were seen among age groups studying in the urban schools. The proportion of children at-risk for APD in the oldest age group (≥ 10 to < 11 years) was found to be significantly different from the younger two age groups (≥ 7 to < 8 years as well as ≥ 8 to < 9 years).

Table 1: Percentage of children who are at-risk for APD in rural and urban government schools

Age groups	Rural schools			Urban schools		
	Total number of children	Number of children at-risk for APD	Percentage of children at-risk for APD	Total number of children	Number of children at-risk for APD	Percentage of children at-risk for APD
≥ 7 to < 8 years	42	233	18.02%	27	228	11.84%
≥ 8 to < 9 years	24	193	12.43%	32	254	12.59%
≥ 9 to < 10 years	35	236	14.83%	31	315	9.84%
≥ 10 to < 11 years	31	237	13.08%	23	333	6.90%

Table 2: Comparison of number of children who are at-risk for APD across age groups in rural and urban schools

Comparison groups	Rural		Urban	
	/z/ Value	*p* Value	/z/ Value	*p* Value
≥ 7 to < 8 years and ≥ 8 to < 9 years	1.58	> 0.05	0.25	> 0.05
≥ 7 to < 8 years and ≥ 9 to < 10 years	0.93	> 0.05	0.74	> 0.05
≥ 7 to < 8 years and ≥ 10 to < 11 years	1.48	> 0.05	2.01	**< 0.05**
≥ 8 to < 9 years and ≥ 9 to < 10 years	0.71	> 0.05	1.04	> 0.05
≥ 8 to < 9 years and ≥ 10 to < 11 years	0.20	> 0.05	2.34	**< 0.05**
≥ 9 to < 10 years and ≥ 10 to < 11 years	0.54	> 0.05	1.35	> 0.05

Effect of family literacy / educational support received by the children and SCAP scores of the children within rural and urban schools

Table 3 provides the mean, standard deviation and median of the SCAP scores, family literacy and educational support for children studying in rural and urban schools. From the Table 3 it can be observed that the SCAP scores and educational support provided to children was higher in rural schools than urban schools. However, family literacy was found to be similar across rural and urban schools in children who were referred on SCAP but in children who were pass on SCAP, family literacy was observed to be high in rural than in urban government schools.

The relation between family literacy / educational support given to the children at home on SCAP scores of the children, was analysed using Spearman's correlation. This was carried out separately for the children in the rural schools, urban schools as well as for the total data (rural + urban). The results of the Spearman's correlation showed a significant but moderate negative correlation between the family literacy and SCAP scores for the children studying rural schools ($r = -0.46$, $p < 0.0001$). However, for children studying in urban schools, this significant negative correlation was weak ($r = -0.31$, $p < 0.0001$). When the data of the rural and urban schools were merged, the significant negative correlation was found to be moderate ($r = -0.40$, $p < 0.0001$). Similarly, educational support given to the children also had a significant

Table 3: Mean, Standard Deviation (SD) and Median for SCAP scores, Family literacy (lit) and Educational Support (Ed Supp) in rural and urban setups for children who pass and are referred on SCAP.

Location		Rural			Urban			Total (rural + urban)		
		SCAP Scores	#Family Lit	##Ed Supp	SCAP Scores	#Family Lit	##Ed Supp	SCAP Scores	#Family Lit	##Ed Supp
Pass SCAP	Mean	2.02	2.03	4.61	3.48	1.74	2.40	2.67	1.90	3.62
	SD	1.79	0.93	1.79	1.53	0.92	1.72	1.83	0.92	2.07
	Median	2.00	2.00	5.00	4.00	1.50	2.50	3.00	2.00	4.50
Referred on SCAP	Mean	9.80	1.35	2.41	8.53	1.29	1.57	9.22	1.32	2.02
	SD	1.75	0.86	2.11	1.89	0.99	1.98	1.92	0.92	2.09
	Median	10.00	1.00	3.00	8.00	1.00	0.75	9.00	1.00	1.00
Total (pass + refer)	Mean	5.87	1.70	3.52	6.04	1.52	1.99	5.94	1.62	2.83
	SD	4.28	0.95	2.24	3.07	0.98	1.90	3.77	0.97	2.23
	Median	5.00	1.50	4.50	6.00	1.50	1.50	5.50	1.50	3.00

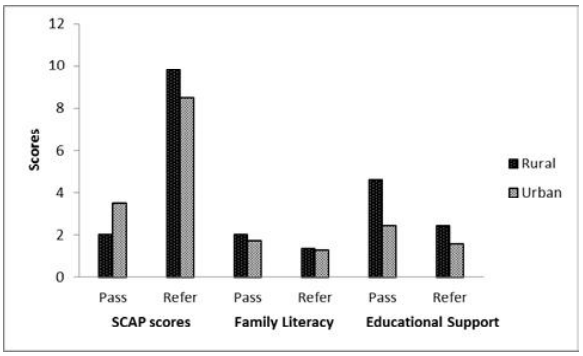
Note. Maximum SCAP score = 12

#Maximum Family Literacy score = 18

##Maximum Educational Support score = 10

moderate negative correlation for the children studying in rural schools ($r = -0.56$, $p < 0.0001$), weak for children studying in urban schools ($r = -0.24$, $p < 0.0001$), and moderate when the data of rural and urban schools were merged ($r = -0.42$, $p < 0.0001$).

The significance of difference between family literacy / educational support received by children across rural and urban schools was evaluated using Mann-Whitney U test. Among children who passed SCAP, a significant difference was present regarding family literacy ($/z/ = -3.01$, $p < 0.0001$) and educational support received ($/z/ = -9.12$, $p < 0.0001$) across in rural and urban schools. However, in children who were at-risk for APD, significant difference was seen only in educational support ($/z/ = -3.02$, $p < 0.0001$) but not in family literacy ($/z/ = -0.88$, $p > 0.05$) across urban and rural schools (Figure 1).



*Note. * = p < 0.05; Maximum SCAP score = 12; Maximum Family Literacy score = 18; Maximum Educational Support score = 10*

Figure 1: Mean scores of SCAP, family literacy and educational support among children who passed and who were referred on SCAP, in rural and urban schools.

Comparison of knowledge of APD / years of experience between teachers in rural and urban schools

The knowledge of teachers regarding APD was compared across rural and urban schools (Table 4). From the Table 4 it can be noted that teachers in rural schools obtained higher scores regarding knowledge of APD than teachers from urban schools. Further, to check if there was a significant difference, an independent t-test was done. The results indicated the presence of a significant difference ($t = 2.89$, $df = 85$; $p < 0.05$) in the knowledge of APD between teachers in rural and urban schools. The knowledge was higher in teachers in rural schools compared to those in urban schools.

The years of experience in teaching varied in teachers working in rural and urban schools with the teachers in the rural schools having lesser experience compared to urban schools (Table 4). To determine the relation between the experience of teachers on their knowledge of APD, Pearson correlation was carried out. The test was done separately for teachers from rural and urban schools. In rural school teachers, a significant negative moderate correlation ($r = -0.39$, $p < 0.01$, 2-tailed) was obtained between their experience and their knowledge of APD. On the other hand, among urban teachers, no significant correlation ($r = 0.02$, $p > 0.89$, 2-tailed) was seen.

Test-Retest Reliability:

Cronbach's alpha was calculated to determine the test-retest reliability of the SCAP scores, family literacy and educational support for children across rural and urban schools. The alpha coefficient was found to be greater than 0.95 for all parameters, indicating that the responses obtained from the teachers was reliable.

From the findings of the study it can be noted that a

Table 4: Mean, Standard Deviation (SD) and Range of years of experience of teachers and their scores regarding knowledge of APD in rural and urban schools.

School location	Teacher related parameters	Range	Mean	SD
Rural	Years of experience	1 to 32	13.05	7.54
	#Scores on knowledge of APD	5 to 17	13.40	2.03
Urban	Years of experience	1 to 34	21.90	7.17
	#Scores on knowledge of APD	3 to 17	11.49	3.34

Note. #Maximum score = 19

significantly higher number of children were at-risk for APD in rural schools compared to urban schools. There was no significant difference noticed across the age groups in rural schools. However, in urban schools, the number of children at-risk for APD was significantly less in those aged ? 10 to < 11 years compared to the younger two age groups (? 7 to < 8 years & ? 8 to < 9 years). Further, a significant negative correlation was seen between family literacy / educational support and SCAP scores in both rural and urban setups. The correlation was moderate for the rural schools, but weak in the urban schools. Similarly, a significant difference was observed in educational support and family literacy for children not at-risk for APD in rural and urban setups, with it being more in rural schools. However, in children who were at-risk for APD, a significant difference was seen only in educational support but not in family literacy in rural and urban schools. Additionally, the teachers from rural schools had a significant higher knowledge of APD compared to teachers from urban schools. Also, a significant negative moderate correlation was found between the experience of teachers and their knowledge of APD in rural schools, whereas no such correlation was seen in urban schools.

Discussion

The results of the study have been discussed in terms of the number of children at-risk for APD across rural and urban schools; effect of family literacy and educational support provided to children out of school on risk for APD; and knowledge of APD by teachers across rural and urban schools.

Comparison of the number of children at-risk for APD across rural and urban schools

The current study revealed that more children were at-risk for APD in rural schools (14.68%) than in urban school (10%). This difference between children in urban and rural schools was found to be statistically significant.

The trend of more children being at-risk for APD in the rural schools compared to the urban schools is in line with the dropout rate seen in rural and urban schools. Studies carried out in India indicate that there are more school dropouts in rural schools than in urban schools (Gouda & Sekher, 2014; Sarva Shiksha Abhiyan, 2013). Researchers have found poor academic performance or repeated failures to be major causes for school dropout (Chigari et al., 2015; Gouda & Sekher, 2014; Govindaraju & Venkatesan, 2010; Minz et al., 2015; National Sample Survey Organisation, 2014; Patil & Malagi, 2013; Pratinidhi et al., 1992; Sarva Shiksha Abhiyan, 2013). It has also been established that children with symptoms of APD have difficulties poor academic performance including poor reading skills (Bellis & Ferre, 1999; Cacace & McFarland, 1998; Jerger & Musick, 2000; Rosen et al., 2010; Sharma et al., 2009; Wit et al., 2016). Thus, it can be speculated that there may be a link between the presence of APD and poor academic performance / school dropouts.

The current study indicates that in urban schools there are a larger number of children at-risk for APD in lower classes compared to the higher classes. This age related difference in urban schools probably occurred as a larger number of children at-risk for APD in lower classes dropout of school, resulting in lesser children being at-risk for APD in the higher classes. Evidence of a larger drop rate in lower classes was also observed in a study by Patil and Malagi (2013) in Bijapur district of Karnataka. They reported that the majority of children dropout from school before reaching their grade 5. Hence, it is possible there exists a link between the number of children who are at-risk for APD and their academic difficulty, resulting in them discontinuing school in urban schools.

In the present study, no age effect was observed in children studying in rural schools. This indicates that the number of children who are at-risk for APD are similar across the classes. While interviewing the teaches during data collection of the study, it was observed that the teachers from the rural schools showed more concern regarding the performance of the children and provide more individual attention. They were probably able to so due to the lesser strength of children per class compared to urban schools. Thus, although a large number of children in the rural schools were at-risk for APD, due to the dedication of the teachers, they continued to study and not dropout. This was unlike what happened in the urban schools.

Family literacy and educational support provided at home for children

In the present study, a significant negative correlation was noted between family literacy / educational support

given to children and the SCAP scores of the children. This negative correlation was found to be moderate in rural schools and weak in urban schools. Thus, it can be inferred that with increase in the educational support given to the children, their symptoms of APD reduced, resulting in lower scores on SCAP. This indicates that if the family literacy and the support given to the children were higher, the symptoms of APD were less. However, family literacy in rural and urban schools (Table 3) was noted to be similar, suggesting that it could not be the reason for the difference in relation between SCAP scores and family literacy in these two educational locations. However, a marked difference existed between the educational support given in the rural and urban schools, with it being more in the former. Hence, it is possible that the support given to the children should have had a greater impact on the SCAP scores rather than the family literacy, especially in those who passed SCAP. However, despite children in the rural schools being provided more educational support, these schools had a larger number of children who obtained poorer scores on SCAP. Thus, it is speculated that the quality of the support was not adequate enough to reduce symptoms of APD in children studying in rural schools

Knowledge of APD / years of experience in teachers across rural and urban schools

The results of the present study indicated that the teachers in rural schools had significantly better knowledge of APD than teachers in urban schools. In addition, a significant negative moderate correlation was found between experience of the teachers and their knowledge regarding APD in rural schools, whereas no such significant correlation was seen in urban schools.

The teachers in the rural schools probably had more knowledge of APD due to frequent orientations programs and workshops organized by non-governmental organizations with the aim to improve the quality of education in rural areas. Such training programs that teachers and children reported of in the rural schools were not mentioned by the teachers in the urban schools. This could have been one of the reasons resulting in a difference between the knowledge of teachers in rural and urban schools.

The experience of the teachers in teaching was found to have a negative correlation with their knowledge of APD in rural government schools but not in urban government schools. Contrary to the general expectation, that teachers with longer experience should have more knowledge, the current study found that those with a shorter experience had more knowledge. The difference in quality of training imparted to teachers over the years could have resulted in those teachers who were trained more recently to have more knowledge of APD. As can been seen from the mean values in Table 4, the teachers in the rural schools had lesser experience compared to urban schools. Thus, it can be construed that the teachers in the rural schools, who were educated more recently, had extra training regarding academic difficulties of children and ways to solve these problems than teachers in urban schools. Further, the younger generation of teachers would have had an added advantage of being more computer literate and hence would have had access of information available in the internet regarding training difficult-to-educate children. Further, it was observed while interviewing the teachers, that those in the rural government schools were more dedicated and cooperative than their counterparts in the urban government schools. These reasons could have led to the teachers with lesser experience having more knowledge about APD.

Conclusions

From the findings of the current study regarding children at-risk for APD in rural and urban schools, it can be speculated that APD may be one of the causes that leads to a larger number of school-dropouts. Further, it was observed that the children studying in higher grades in urban schools had fewer children at-risk for APD, probably because those with poor academic performance would have dropped out from the school in the lower grades. On the other hand, in rural schools, no difference in number of children at-risk for APD was seen across grades, perhaps due to the individual attention and help given by the teachers to enable the children to continue with their studies. Additionally, family literacy and educational support was found to be correlated with SCAP scores of the children, with educational support being considered to be a more important factor than family literacy. Further, the teachers from rural schools had more knowledge of APD than urban schools, probably due to frequent orientation programs and workshops conducted for them, and due to the quality in their teacher training programs. It is speculated that the presence of symptoms of APD may be one of the factors that results in children having poor academic performance leading them to drop out of school. It needs to be further evaluated whether symptoms of APD influence the educational outcome of children in schools.

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