

Medical risk factors including intelligence quotient associated with poor scholastic performance in regular school going early adolescent (10-12yrs) children

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Abstract

Introduction: Identifying various medical conditions associated with poor scholastic performance (PSP) of adolescents is must before the remedial steps could be taken. The efforts should be moved beyond health care facility based approach. Children should be examined at school to pick these diseases even when these are inconspicuous.

Material and Method: Case control study including 150 children with poor scholastic performance were cases and 150 students of same school and same class but getting good grades were controls. Students were examined at school to detect these commonly found 6 medical conditions having proven association with PSP namely severe thinness, clinical anemia, impaired uncorrected vision, clinical deafness, bronchial asthma and recurrent headache. These were independent study variables IQ was done only in cases (150) at Santosh hospital Ghaziabad by MIWISC battery test. Primary outcome variable was PSP. Chi Square test and odds ratios were calculated to know significance of association.

Results: significant association was found between all conditions and PSP except for vision problems. Around two third students in PSP group had normal to superior IQ scores.

Conclusion: A simple and focused school health programme done regularly will be able to target maximum number of adolescents and tackle these conditions long before these become apparent, so prevent harmful influence on learning potential.

Keywords: Poor scholastic performance, Adolescents, Medical risk factors.

Introduction

In today's competitive world academic excellence is equated with future success. This has lead to focused and greater efforts by parents, teachers and children to get good grades. Yet the literature search reveals the prevalence of poor school performance (PSP) ranging from 5-37%.^(1,2)

Implications of scholastic backwardness become heart wrenching with media reports of self-harm by aspiring adolescents, succumbing under the pressure of parental and self-expectations. Present study is an attempt to face the resultant 'guilt and query' - 'Can we paediatricians be of any help to these students? Because the usual circumstances of a child meeting a paediatrician is at a busy health facility. Here the focus remain the presenting complaints, overlooking the other associated conditions which are although inconspicuous yet are harmfully influencing the learning potential of child.

So it was planned to meet students who are apparently fit enough to attend school, under a school health programme and examine them according to a predecided perfoma. Intention was to gather relevant evidence of existence of some commonly implicated medical conditions having proven association with PSP by previous researchers.

The chosen conditions in present study were malnutrition,^(3,4,5) anaemia,^(6,7) uncorrected refractive errors,⁽⁸⁾ conductive deafness,⁽⁹⁾ and some common chronic conditions like bronchial asthma⁽¹⁰⁾ and headache.⁽¹¹⁾ All these conditions have proven

association with scholastic performance conducted by different researchers. The illness once identified can then be tackled at a health care facility by specialists. The challenge was to keep this school health programme simple enough to be undertaken by interns and junior residents, with minimum equipments, expertise and time taken, and preferably non-invasive.

It was also decided to get formal IQ assessment for scholastically backward students, to know their actual learning potential.

Material and Methods

Analytic case control study .Data collected during April 2014-May 2015 from a private school situated near Santosh Hospital Ghaziabad, after permission from institute ethical committee.

Sampling was purposive (due to feasibility within available resources) where study subjects were enrolled from this one school only.

Sample Size: was calculated by formula -

sample size, = $4pq/d^2$ where

p = prevalence of PSP, taken as 30%^(1,2)

q = 1-p

d = permissible error in the prevalence of PSP, (keeping α error at 5% and β error at 80%)

= $20/100 \times 30$

= 6

So the required minimal sample size was

= $4 \times 30 \times 70 / 6 \times 6$

= 210

Keeping 1:1 ratio of cases and controls (150 students in each group), total 300 subjects were enrolled.

Primary outcome variable was PSP

A child was considered to have poor scholastic performance (PSP),⁽¹²⁾ if he has any one of the following in current academic session-

- 1) Child who fails in one or more subjects.
- 2) Child in the lower 10th percentile marks in class.
- 3) Child identified by parents/teachers as difficult to teach. OR
- 4) A Child who failed in one or more classes.

Inclusion criteria for cases was 10 to 12 years' old children fulfilling the chosen definition of PSP and going to regular School (meant for normal children).

Inclusion criteria for controls was children in same class and same school with good academic performance (considered when marks were above 50th percentile).

Short listed Medical conditions (of already proven association with PSP) as independent Variables were

- 1) BMI which was categorized as-
Normal: BMI for age Z-score of +2SD to -2SD.
Obesity: BMI for age Z-score of >+2SD.
Thinness: BMI for age Z-score of <-2SD.
Severe thinness: BMI for age Z-score of <-3SD.
- 2) Clinical Anaemia assessed by palmar pallor.
- 3) Impaired Corrected Vision Using Snellen's test type (English) for distance as well as near vision. Children who were using spectacles prior to checkup were asked to keep wearing them during assessment
- 4) Clinical Deafness and ENT examination by tuning fork tests- Weber's and Rinne's test. Auroscopic examination to detect otitis media, effusion, perforation.
- 5) Recurrent and chronic headache and
- 6) Bronchial asthma by suggestive symptoms in history.
- 7) IQ assessment by Malin's Indian Adaptation of WISC (Wechsler Intelligence Scale for Children).

IQ scores were divided based on current Weschler classification into following categories-

Superior =120 – 129,

High average =110 – 119,

Average =90 – 109,

Low average=80 – 89

Borderline=70 – 79

Extremely low (mild MR) = IQ less than 70-50

Methodology: Under Institute run school health program all the students underwent focused general physical examination, screened for refractive errors & hearing problems at school by junior residents of various concerned departments. For IQ evaluation children were referred to clinical psychologist at Santosh hospital at a later appointed date, which took one or maximum two sessions. Parental consent was must for this test. For all diagnosed medical conditions, children were informed about the availability of concerned specialists at Santosh hospital, but follow up was not done in this context.

Statistical analysis: (SPSS version 19) Odds Ratio (with Confidence Interval) and Chi square were calculated. P value was significant if it was 0.05 or less.

Results

Population characteristics - Around 66% (100) of cases and 74% (112) of controls were in the age group of 11-12 years. More than 85% of both cases and controls were in class 6th and 7th.

75.3% (113) cases and 82.6% (124) of controls were from SES class III or IV of Modified Kuppaswamy scale, 2012.

Almost all the 'accused' medical conditions namely severe thinness, clinical anaemia, clinical deafness, recurrent headache and bronchial asthma were found 'guilty' by data collected under simple and quick yet comprehensive school health programme. Table 1 & 2 highlight the statistically significant p value of chi square test and Odd's ratio with confidence interval for studied medical conditions.

Only exception to above observations was 'impaired corrected vision' which was although commoner in cases (41%) than in controls (32%), but the association was statistically insignificant.

One very relevant observation in relation to IQ and PSP children was that, approximately 14% (22) students in this group were having IQ scores in 'superior Category'. While 56% (84) student's in PSP group had 'average IQ'.

Less than one third students of PSP group had IQ in low average category (2 children & 1.3%), borderline (28 children & 18.7%) and in mild mental retardation category (15 children & 10%).

Table 1: Frequency Distribution of Study subjects according to BMI categories (N =300)

BMI Category	Cases (150)		Controls (150)		Chi square & p value
	n	%	n	%	
Severely Thin	74	49.3	49	32.6	16.30 (p-value .003)
Thin	37	24.6	67	44.6	
Normal	37	24.6	34	21.3	
Obese	2	1.3	0	0	

Table 2: Frequency Distribution of Study Subjects according to studied Medical Risk Factors

Medical Risk Factor Present	Cases (150)		Controls(150)		Odds Ratio	Confidence Interval
	n	%	n	%		
Clinical Anaemia	101	67.3	55	36.7	0.281*	0.174 - 0.452*
Impaired Corrected Vision	62	41.3	48	32	0.668	0.416 – 1.071
Clinical Deafness	47	31.3	14	19.3	0.226*	0.118 - 0.432*
Recurrent Headache	50	33.3	24	16	0.381*	0.219 - 0.662*
Bronchial Asthma	19	12.7	5	3.3	0.238*	0.086 - 0.655*

*Statistically significant

Discussion

Present study was an attempt via a simple school health programme, to successfully identify the medical conditions of already proven association with PSP having harmful influencing on learning of adolescents.

The reasons behind selecting only these conditions were-

1) that all of them are quite common 2) remain very inconspicuous before becoming apparent, till then significant damage to learning domain has occurred 3) acceptance to the remedy (e.g. spectacles) was often not acceptable to image conscious adolescents 4) the presenting symptoms of these diseases even if noticed and mentioned by child are often not taken seriously by parents who consider these as excuses not to study 5) these hamper the learning by interfering with receiving of inputs (poor vision or hearing deficiency) and also by interfering with interpretation (poor short term memory, short attention span)

The results revealed that predecided checkup plan could be done quickly, required minimal equipment's and setup, was easy and noninvasive so had high acceptance. Yet this methodology was sensitive enough and identified the existent association between PSP and severe thinness, anaemia, conductive deafness, bronchial asthma and recurrent headache. The purpose of having a formal IQ score (and category) of poor scholastic performers was primarily to know the actual learning potential of such students. Because the IQ scores of these PSP students ranged from average to superior category in more than two third children it was felt that motivating the students, parents and teachers about the bright prospect of remedial steps will become easier.

These were the strengths of present research.

One of the major limitations of this study is involvement of a single school which make external validity poor. Before these results and conclusion could be generalised further research would be needed including different populations from different socio-economic strata and different geographical areas. Moreover the presence or absence of a medical condition was based solely on clinical examination which might have missed many mild deficiencies.

Conclusion

A simple and focused (but done **regularly**) school health programme involving maximum schools targeting atleast early adolescents (because it is when the pressure to excel in academics starts mounting) followed by counselling to avail needed remedial intervention by specialists.

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