Screening Program for Idiopathic Scoliosis by Adam's Bending Forward Test of Prepubertal Children at Primary Schools in Baghdad City

برنامج التحري عن الجنف التلقائي بفحص آدم للاطفال ما قبل سن البلوغ في المدارس الابتدائية في مدينة بغداد

Buthainah B. Saleh, M.Sc. N*
Eqbal G. Ma´ala, PhD**

***Academic Nurse, Medical City, Ministry of Health**
****Professor, Pediatric Nursing Department, Collage of Nursing, University of Baghdad,**
deanship_bagh@yahoo.com

المستخلص:

الهدف: تهدف هذه الدراسة مسح الاطفال ما قبل البلوغ المصابين بالجنف التلقائي للعمود الفقري، و ايجاد العلاقة ما بين الجنف التلقائي والمعلومات الديموغرافية كالعمر ،الجنس ،مقياس كتلة الجسم ، ثقل الحقيبة المدرسية وامراض القلب والرئة .

المنهجية: دراسة وصفية اجريت في جانبي الكرخ والرصافة كبرنامج مسحي للجنف التلقائي لاطفال المدارس الابتدائية بسن ما قبل البلوغ للفترة من ٢٤ من شهر شباط الى نهاية تشرين الاول لعام٢٠١٠ . اختيرت عينة غرضية (غير محتملة) من ٥١٠ طالب وطالبة من المدارس الابتدائية لجانبي الكرخ والرصافة لمدينة بغداد. حددت مصداقية الاسئلة الاستبيانية بواسطة مجموعة من الخبراء من ذوي العلاقة بحقل الدراسة ، اما الثبات فمن خلال دراسة استطلاعية . جمعت معلومات الدراسةمن خلال استمارة استبيانية مكونة من(٢٤) فقرة اسئلة ذات متعدد حول الجنف التلقائي ، الفحص وملاحظات الباحث. حللت المعلومات باستخدام التحليل الاحصائي الوصفي (التكرررات والنسبة المئوية) ،والتحليل الاحصائي الاستنتاجي (مربع – كاي).

النتائج: اثبتت نتائج الدراسة ان اكثر الاطفال في سن ما قبل البلوغ المصابين بالجنف التلقائي يشكلون ثلثي العينة(٨٨،٤%)عند عمر (١٠-١٢) سنة واكثرمن نصفهم من الذكور وكان(انخفاض مقدار كتلة الجسم وثقل الحقيبة المدرسية) ذات علاقة معنوية عالية باصابة الطلاب بالجنف التلقائي. واظهرت نتائج الدراسة علاقة معنوية عالية ذات دلالة احصائية بين الاطفال ما قبل سن البلوغ المصابين بالجنف التلقائي مع ملاحظة وفحص الباحث للطلاب بطريقة آدم عند الانحناء.

التوصيات : اوصت الدراسة بالتاكيد على تفعيل البرنامج المسحي للجنف من قبل وزارة الصحة مع برامج الخدمات الصحية المدرسية الاخـرى. وشمول وزارة التربية في المسح لمشاكل الجنف التلقائي واشراك وتدريب مدرسيها في هذا البرنامج.

Abstract

Objective: The study aimed to screen the prepubertal children for idiopathic scoliosis at earlier stages, and find out the relationship between idiopathic scoliosis and demographic data such as age, sex, body mass index, heavy backpacks, and heart & lung diseases.

Methodology: A descriptive study was conducted on screening program for prepubertal children in primary schools at Baghdad city, starting from 24th of February to the end of October 2010. Non- probability (purposive) sample of 510 prepubertal children were chosen from primary schools of both sides of Al-Karkh and Al-Russafa sectors. Data was collected through a specially constructed questionnaire format include (24) items multiple choice questions, and researcher observation. The validity of the questionnaire was determined through a panel of experts related to the field of the study, and the reliability through a pilot study. The data were analyzed through the application of descriptive statistical analysis frequency, & percentages, and inferential statistical analysis, chi-square, are used.

Results: The study results revealed that most of the prepubertal children have idiopathic scoliosis, two third of the sample (88.4%) were at age 10-12 years and mostly boys. There is highly significant association with (low Body Mass Index & carry of the school backpack) but no significant association with the age, gender, and lung & heart diseases. There is highly significant association between prepubertal children's idiopathic scoliosis signs & the researcher observation for the prepubertal body feature, and Adam's Bending Forward Test which revealed highly significant association with their idiopathic scoliosis. The results of the study reflect that the majority of prepubertal children's idiopathic scoliosis deformities have significant association at early detection than the other spinal deformities (kyphosis & kyphoscoliosis).

Recommendation: The researchers recommended that Ministry Of Health should activate the screening program of scoliosis within school health service programs, and Ministry of Education should be involved their teachers in the screening & training program.

Keywords: Screening Program, Idiopathic Scoliosis and Prepubertal Children.

Introduction:

Scoliosis is a medical condition in which a person's spine is curved from side to side, shaped like an ((S)) or ((C)) than a straight line. An estimated 2.8- 3 million Americans have some degree of spinal curvature. The condition is more prevalent in females (2%) than in males (0, 5%), and of those diagnosed each year, some 27,000 have curves severe enough to warrant corrective spine surgery. Although the condition can develop at any age, it is most commonly identified between the ages of 9   and 15 [1].

The aim of school screening is to identify most or all of the individuals with unrecognized Idiopathic Scoliosis (IS) at early stage when a less invasive treatment is more effective. However like other medical screening programs it has not escaped controversy about its value [2].

Scoliosis, a term used by Hippocrates, means abnormal curvature of the spine. It is defined as one or more lateral curvatures of the spine [3] [4].

Examination of the trunk is done while the patient is standing, bending over, and lying down. The forward bending test is sometimes referred to as the Adams test.   Children with this affliction with experience loss of physical function, postural instability, discomfort, decreased self-image and numerous physiological dysfunctions including decreased oxygenation which are secondary impairments to the scoliosis itself [5].

Upon physical examination, the spinal curvature is readily noted when observing the child from the dorsal or ventral aspect of the trunk .The condition of scoliosis is often presented as a pelvic or shoulder asymmetry with imbalanced symmetry of the trunk laterally to the left or right [6].

In eighty percent of patients, the cause of scoliosis is unknown. Such cases are called idiopathic scoliosis. Idiopathic scoliosis may be classified based on age of presentation while age of onset may also determine the treatment approach, Scoliosis can be congenital, or it can develop during infancy or childhood, but it is most common during the growth spurt of early adolescence. It can be caused by a number of conditions and may occur alone or in association with other diseases, particularly neuromuscular conditions. In most cases, however, there is no apparent cause, and it is called idiopathic scoliosis. Idiopathic scoliosis has an incidence of 2 to 3% in children aged 10 to 16 years of age in the United States of America   (USA).   Worldwide   prevalence, including all forms of scoliosis, is said to be 1% of the population. [7] [8]

Methodology:

Descriptive study was conducted on screening program for prepubertal children in primary schools for idiopathic scoliosis at both sides Al-Karkh and Al- Russafa sectors of Baghdad city. Data collection started from 24th of February to the end of October 2010. Non – probability (purposive) sample of 510 students were chosen randomly.

The questionnaire format was constructed after thorough reviewing of literature and related studies. The study instrument comprised of two parts, which includes: Part I: Prepubertal & their families' demographic data sheet, Part II: Student's researcher observation and Adam's Bending Forward.

Results:

Table 1. Distribution of Demographic Characteristic of the Prepuberal Children and Its Association with Idiopathic Scoliosis

Demographic data/ Information about Prepuberal Children	Total		Prepubertal children with Idiopathic Scoliosis		P. value
	**No.	%	**No.	%	
prepuberal children's age (years) 10--12	451	88.4	230	51.0	0.476
13--15	59	11.6	33	55.9	
prepuberal children's gender Boy	224	43.9	121	54.0	0.327
	286	56.1	142	49.7	

*Significant using Pearson chi-squared test at p≤ 0.05 level of significance **No. = number; %=percentage; P=probability level

This table shows that (55.9%) of the sample at age 13-15, and (54%) boys have IS. But there is no significant association with Idiopathic Scoliosis.

Table 2. Distribution of Demographic Characteristic (Methods of carrying backpack) of the Prepuberal Children and Its Association with Idiopathic Scoliosis

Methods of carrying backpack	Total		Prepubertal children with Idiopathic Scoliosis		P. value
	**No.	%	**No.	%	
On the back	360	70.6	175	48.6	
On the right side	79	15.5	52	65.8	0.021*
On the left side	71	13.9	36	50.7	

*Significant using Pearson chi-squared test at p≤0.05 level of significance, ** No = Number; %=percentage; P=probability level

This table shows that idiopathic scoliosis has significant association with prepubertal children's methods of carrying backpack

Table 3. Researcher Observation of Prepuberal Children's Body Features and Its association with Idiopathic Scoliosis

NO.	Researcher observation for the prepuberal children	Total		Prepubertal Children with Idiopathic Scoliosis		P. value
		**No.	%	**No.	%	
1.	At standing / posterior (Head alignment)					
1.1	Central	391	76.7	188	48.1	0.011*
1.2	Tilted to the right side	66	12.9	44	66.7	
1.3	Tilted to the left side	53	10.4	31	58.5	
2.	Level of shoulder's blades					
2.1	Symmetry	191	37.5	65	34.0	0.0001*
2.2	The right one stands out more	133	26.1	88	66.2	
2.3	The left one stands out more	186	36.5	110	59.1	
3.	Level of scapula					
3.1	Symmetry	191	37.5	63	33.0	0.0001*
3.2	Prominence of the right side	177	34.7	99	55.9	
3.3	Prominence of the left side	142	27.8	101	71.1	
4.	Upper of the back					
4.1	Equal (even)	499	97.8	254	50.9	0.042*
4.2	Hump	11	2.2	9	81.8	
5.	Equal distance between arms and body					
5.1	Yes	187	36.7	63	33.7	0.0001*
5.2	No	323	63.3	200	61.9	

*Significant using Pearson chi-squared test at p≤ 0.05 level of significance, ** No. = Number; %=percentage; P=probability level

This table shows that (66.7%, 58.5%, 48.1%) of prepubertal children's head titled to the right side, to the left side & centre respectively. While their level of the shoulder blades shows (66.2%, 59.1 %,) to the right shoulder stands out more & the left shoulder stands out more respectively.

While level of scapula revealed high percentage (71.1%) prominence of the left side, 81.8% of prepuberal children have hump. Only 33.7% have an equal distance between arms & body. There is highly significant association value with IS.

Table 4. Adam's Bending Forward Test Carried out by the Researcher and Its association with Idiopathic Scoliosis

NO.	Adam's Bending Forward Test	Total		Prepubertal Children with Idiopathic Scoliosis		P value
		**No.	%	**No.	%	
1.	**Kyphosis appeared in the back**					
1.1	**Yes**	9	1.8	8	88.9	0.024*
1.2	No	501	98.2	255	50.9	
2.	**Bulge of the right rib cage**					
2.1	**Yes**	189	37.1	189	100.0	0.0001*
2.2	No	321	62.9	74	23.1	
3.	**Bulge of the left rib cage**					
3.1	**Yes**	74	14.5	74	100.0	0.0001*
3.2	No	436	85.5	189	43.3	
4.	**Are there kyphoscoliosis**					
4.1	**Yes**	8	1.6	8	100.0	0.006*
4.2	No	502	98.4	255	50.8	
5.	**Are there scoliosis**					
5.1	**Yes**	263	51.6	263	100.0	-
5.2	No	247	48.4	-	-	
6.	**The site of the scoliosis**					
6.1	**Thoracic**					
	Yes	14	2.7	14	100.0	0.0001*
	No	496	97.3	249	59.2	
6.2	**Thoracolumber**					
	Yes	247	48.4	247	100.0	0.0001*
	No	263	51.6	14	5.3	
6.3	**Lumber**					
	Yes	2	0.4	2	100.0	0.170
	No	508	99.6	261	51.4	

*Significant using Pearson chi-squared test at p≤ 0.05 level of significance; **No. = Number; %= percentage; P=probability level

This table shows that 50.9% of prepubertal children have no kyphosis, while bulge of the rib cage represent (100%, 100%) to the right & to the left rib cage respectively, 50.8% has no kyphoscoliosis , & 100% prepubertal children have scoliosis . Thoracolumber site of the scoliosis represent highly percentage 100%. There is highly significant association of prepubertal children's IS & all items of Adam's Bending Forward Test (ABFT) except lumber site.

Discussion:

The sample of the study consists of 510 students at grads 5 & 6 from 12 primary schools chosen randomly for total 1202 schools in Baghdad city.

Two third of the sample (88.4%) of (451) at age (10-12) years old, and (51.0%) of (230) have idiopathic scoliosis shows that in table (1), this result consistent evidence is available in the Iraqi study that found (49.5%) of students have scoliosis at age of 10-13 years old. A study in Singapore, found a total of 93,626 out of 119,611 (78.28%) coverage female students in the primary & secondary levels at (aged 9-13 years) [9][10].

The result of the present study in table (1) revealed that the total of children screened for idiopathic scoliosis association with gender shows a few or no differences between both male and female.

The present study in table (2) the backpack's methods carrying by the students & its effect on them spine e.g. Idiopathic Scoliosis

(IS). this result is consistent with a study that found (60.9%) carrying their backpack by hand, while (39.1%) carrying it on back, the result consistent evidence is available with the prevalence of shoulder & scapula asymmetry & excessive weight of carrying school materials was found to be (44%, 5.0%, and 4.0%) respectively in private, municipal, and United States of America schools (USAs), and found a statistical association between presences of scoliosis and the weight of school materials (p= 0.08). Which explain the effects of heavy load on our students & our family does not pay any attention to this problem [9] [11].

the sign of Idiopathic Scoliosis (IS) for the prepubertal children there is highly positive results of scoliosis this shows in table (3), a study present supportive evidence to this result that found (Children at risk identified in an urban scoliosis school program: a new model) & (Idiopathic scoliosis in Singapore school children they found a highly positive scoliosis) [12][13].

Adam's Bending Forward Test (ABFT) shows that the majority (100.0%) of prepubertal have positive signs of scoliosis that present in table (4) & this result contrast with United States (U.S.) studies for the 1,058 children screened, 30 (2.8%) were positive for scoliosis [12][14].

Kyphosis is one of the spinal deformities that some students who have scoliosis may have this problem too. The present study results reflected that some students in table (4) Adam's test out of 8 students have problem related to kyphosis and the present study that found 8 children (1.0%) have kyphoscoliosis and highly significant with Idiopathic Scoliosis (IS) (p=0.006), and this result consistent evidence is available with a study that found 28 children of kyphoscoliosis (19 males &9 females) at age 12 years and with mean angle of 75º degree in kyphosis & 48º degree in scoliosis by cobb´s angle measurement, [16] .

Table (4) shows that most of prepubertal children have thoraco-lumber

curve, and a study that found the ratio 37% for the site of the curve in Singapore School Children and it was supportive with the present study [13] [17].

Recommendations

1. The screening program should be included or reactive in the school health programs services in (Ministry Of Health) with other school health programs.
2. Educating & training the health team about screening program activity & the method of the Adam's Bending Forward Test (ABFT).
3. Discussing the problem with (Ministry Of Education) especially effects of the carrying heavy backpacks on the student's spinal column and find a way to decreased the heavy backpacks & loading of the books on the back of the students.

References:

1. Beers MH, Berkow R. **The Merck Manual of Diagnosis and Therapy**, Merck Research Laboratories. 1999; 17th Edition, pp 2429.
2. Dawson EG. **Childhood scoliosis, Treatment and Recovery**, Spine Universe. Com, 2005.
3. Horwitz DC, Steven M. U.S. **Olympic Team Chiropractor: Scoliosis screening program**. 1996; Pp.1-2.
4. **Guidelines for Spinal Screening in Schools. Scoliosis Screening Manual**. September; 2004.
5. Early MB. **Physical disfunction**, 1992; 2nd ed. Missonr, Mosby.
6. Richards BS, Vitale M. AAOS – SRS-POSNA-AAP Information Statement, Screening for Idiopathic Scoliosis in Adolescents. 2009.
7. **National Inpatient Profile**, Chicago, IL: SMS Marketing Group, Inc, 2000.
8. Grivas TB, Vasiliadis ES, Roddopoulos G, and Kovanis I. **School screening as a research tool in epidemiology**, natural history and aetiology of idiopathic scoliosis: Stud Health Technol Inform. 2008; 135:84-93.
9. Rummani SF. **School screening for scoliosis in an area in Baghdad**. A thesis. 1990.

10. Yong F, Wong H, Chow K. **Prevalence of Adolescent Idiopathic Scoliosis among Female School Children in Singapore**, 2003.

11. Smith FM, Latchford G, Hall RM, Millner PA, Dickson RA. **Indications of disordered eating in adolescent idiopathic scoliosis patients**. St James' University Hospital, Leeds, UK. 2001.

12. Kapoor M, Laham SG, Sawyer JR. **Children at risk identified in an urban scoliosis school program: a new model**. J Pediatr Orthop B, 2008; Nov. 17(6):281-287.

13. Wong H K, Hui JH, Rajan V, Chia HP. **Idiopathic Scoliosis in Singapore School Children, prevalence study 15 years into spine screening.** 2005; 30: 1188-1196.

14. Nery LS, Halpern R, Nery PC, Nehme KP, Stein AT. **Prevalence of scoliosis among school students in a town in Southern Brazil**. 2010.

15. Nissinen M, Heliovaara M, Seitsamo J, Poussa M. **Trunk asymmetry posture, growth and risk of scoliosis**, Spine, 1993, 18:8-13.

16. Zhang YG, Wang Y, Zhang XS, Maok Y, Wang Z. **Safety and efficacy of resection of hemi vertebrae by posterior approach in treatment of thoraco-lumber kyphoscoliosis in adolescents**. 2006; 18, 86(27):1881-4.

17. Koukoarakis I, Giaourakis G, Kouvidis G, Kivernitakis E, Blazos J, oukoarakis. **Screening school children for scoliosis on the island of Crete**. Greece. J. Spinal Disord. 1997; 10: 527-31 **Children, prevalence study 15 years into spine screening.** 2005; 30: 1188-1196.