HISTORY OF SCOLIOSIS AND SCHOOL SCREENING

HISTORY OF SCOLIOSIS

SCOLIOSIS IN THE PAST

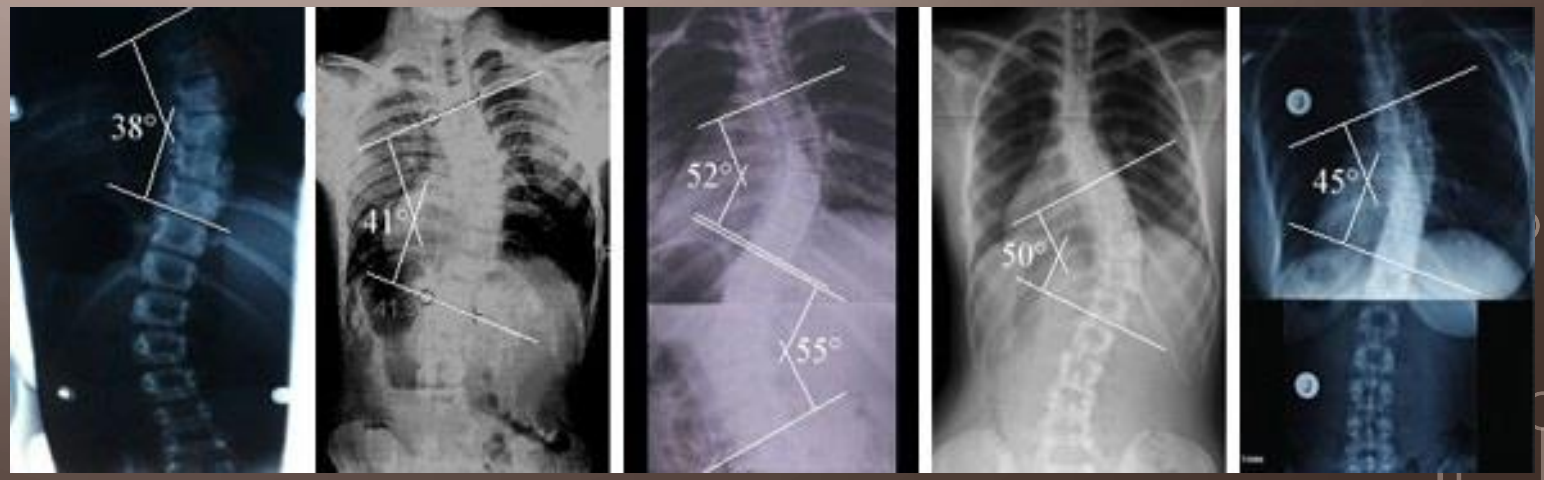
- We've known about it for at least two-and-a-half millennia. Ancient Greeks were the first people to discover it. Here's a short overview of important historical events regarding scoliosis.

1. Ancient Greece

- Hippocrates (460–377BC) was the first to describe abnormal spinal curvature in the Western medical literature; he coined the term ‘scoliosis’ (skolios is Greek for ‘bent’) and thought the condition was due to poor posture. His recommended treatment was axial distraction on an extension apparatus known as a Hippocratic board.
- Claudius Galen (131–201AD) refined Hippocrates’s account and distinguished three types of spinal deformity: scoliosis, kyphosis and lordosis.

2. Cobb Angle Measurement

There were many proposed solutions for the diagnosis and treatment of scoliosis throughout the centuries. In the early 1930s, J. R. Cobb, an American surgeon, came up with a scoliosis-measurement system that is used to this day. He was the first modern medical professional that worked on better understanding the medical condition and making an effort to avoid unnecessary surgery.



- 3. Ambroise Paré

  In the early 1970s, Ambroise Paré found out that in order to stop the progression of scoliosis, a brace can be used to properly position the spine and give the child proper posture.

- The concept of bracing had been around for a long time, however, Paré was the first to suggest continuous bracing until the spine is straightened out or until the child reached a certain age and stopped developing.

SCOLIOSIS IN THE PRESENT

- Most parents nowadays tend to ask what they could've done to prevent scoliosis. Some blame heavy backpacks, others blame bad posture. However, we still don't know much about what causes scoliosis.

1. Genetics Connection

Although a huge number of scoliosis cases don’t have a known cause, doctors are sure that your genetics plays a huge part in the process. As much as 20% of scoliosis patients have someone in their family with the same problem. Even though this information doesn’t help us too much with the treatment, it can help us in the future to improve scoliosis prevention.

2. Scoliosis Treatment:

Scoliosis treatment seems a huge ordeal to many parents. Most imagine it to be prolonged and painful for the child.

Treatment:

- 70% of cases don’t require any attention
- 30% require bracing
- 10% require any medical procedures

3. Surgery as a Last Resort

Like we mentioned above, only a handful of patients need to undergo surgery. A doctor will only recommend surgery if the child’s back doesn’t show any signs of progress after wearing a back brace for a prolonged period. Thankfully, a large percentage of surgeries has had a positive outcome.

SCOLIOSIS IN THE FUTURE

- Many things we know about scoliosis contradict one another. It's a complicated condition and it's a real possibility that we'll have to wait for decades until we come to a breakthrough in its treatment. But here are a few things that can have a huge impact on the future of scoliosis treatment.

1. Treating it as Condition

All of the 28 genetic variant scoliosis groups have been known to scientists for the last few decades. The good news is, we now have developed treatments for all 28 variants. In the past, scoliosis was mainly treated in the context of the spinal curve, but more and more doctors are viewing it as a condition. There are other signs of scoliosis, other than the development of the spinal curvature.

2. Early Stage Intervention

The sooner scoliosis is discovered, the sooner it can be treated. That’s simple common sense, right? But early intervention can be dangerous for some children, especially toddlers. For that reason, medical specialists are now working on developing non-invasive interventions, which can be performed at the early stages of the condition. With early-stage tests and interventions, scoliosis can be prevented altogether.

3. Genetic Testing

Medical professionals are now working on developing early-sign DNA tests that will show which child is likely to develop the condition at a certain point in their life. Early tests are available now, however, they still require some tweaks, plus they cost more than 3,000 dollars apiece.

SCHOOL SCREENING

- School-based spinal screening helps to identify adolescents with abnormal spinal curves and refer them for appropriate follow-up with their doctor.

- Screening can detect scoliosis at an early stage when the curve is mild and may go unnoticed. Early detection is key to controlling spinal deformities.

PURPOSE OF SCHOOL SCREENING

The major objectives of a school scoliosis screening program are to:

- Identify students with spinal curves.
- Establish follow-up procedures to ensure that each identified student will receive appropriate care.
- Provide teachers with recommendations and/or restrictions to a student's educational program.

ESTABLISHING PRIORITIES

A. Scoliosis screening must be administered at least annually to all students age 8-16 years.

B. Scoliosis screening may be done at any time deemed necessary by school authorities. Such occasions might include students with a family history of scoliosis.

C. Some students may not need screening if they are already under care for regular, periodic evaluation for their spinal deformity.

SELECTION OF SCREENERS

The following school staff may be selected to serve as screeners and should complete appropriate training:

- Physical therapist
- Physician assistant
- School physician
- School nurse

SCREENING OPTIONS

Scoliosis screening may be offered as:

a. Part of physical examinations at the mandated grades, for interscholastic sports participation, working papers, or other such activities.
b. Part of the nursing assessment package, with other required screenings.
c. Part of the physical education program.
d. A separate screening activity by class or grade

SITE SELECTION AND PREPARATION

a. The screening area should be located where the students can change clothing in privacy yet be close to the screening station. Possible sites are gymnasium, locker room, or health office.

b. At the time screening is in process the area selected should not be used for other than the screening activity.

c. The area selected should be warm, well-lighted, and permit screening to be done individually and with privacy.

d. The screening stations should be equipped with a chair and desk or table for each screener. Information must be recorded as the screening progresses.

e. A tape should be placed on the floor of each station to indicate where the student should stand during screening.

PREPARATION OF STUDENTS

a. Boys and girls should be screened separately.
b. All students should be seen and screened individually.
c. Boys should strip to the waist and wear briefs or gym shorts.
d. Girls should be requested to wear shorts and a halter or a bra. Leotards or one piece bathing suits tend to camouflage the lower spine area and prevent adequate examination.
e. All students should remove shoes or sneakers before screening.

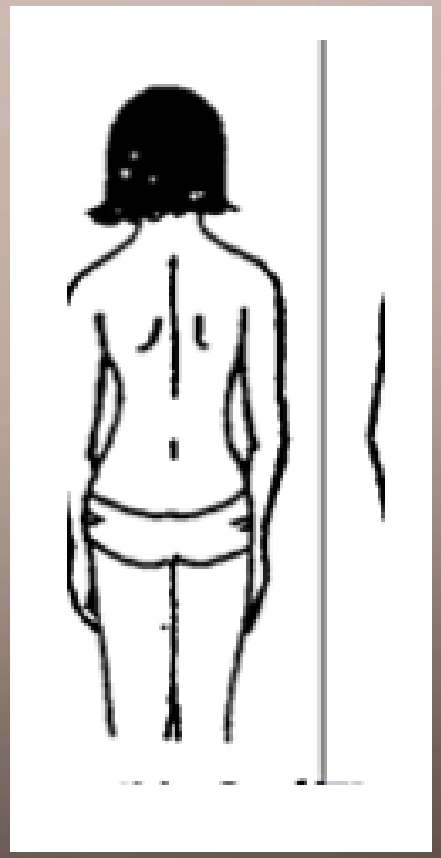
CRITERIA FOR REFERRAL

- Eight degrees or more on scoliometer
- A combined reading (thoracic and lumbar) of 10 degrees or more
- Obvious curvature of the spine (or kyphosis or lordosis)
- Two or more of the following:
  - Shoulder or scapula asymmetry
  - Space between arms and body greater on one side
  - One hip higher than the other
  - Waist creases uneven

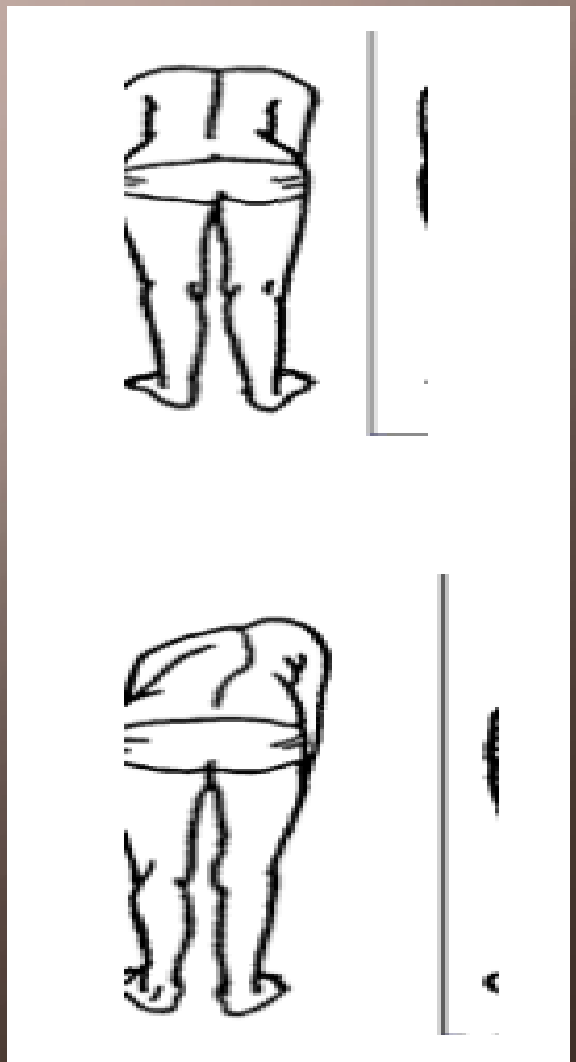
SCREENING PROCEDURE

- All students should be asked if there is a family history of scoliosis. Every child should be screened in each of the following positions:

1. Back View. (The screener should be seated five to eight feet from the tape mark on the floor.



2. Forward bend test.



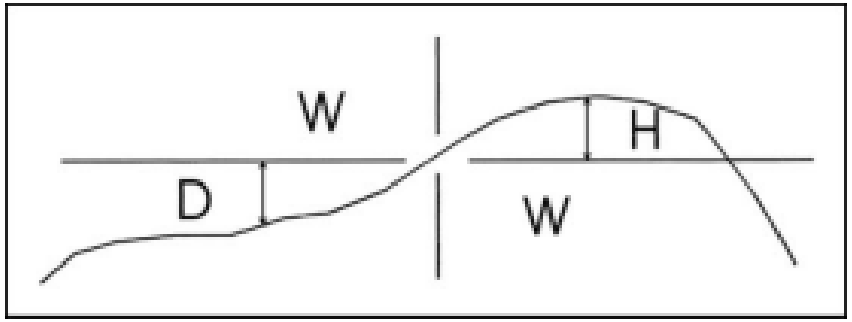
3. Frontal View. Have the student turn and face the screener and repeat the Forward Bend Test.

4. Scoliometer

5. Moiré Topography

Image of Moiré topography. The patient stands with his chest to the wall, and the Moiré lines are projected onto his backs; the test administrator takes a photograph of the resulting projection. Reproduced/adapted with permission from Porto

6. Humpometer



A humpometer line drawing. After the magnetic strips are locked onto the patient's back, the strip can be traced, resulting in a line like this example. H = hump, D = depression; H + D = deformity. Reproduced/adapted with permission from Karachalios T, Sofianos J, Roidis N, Sapkas G, Korres D, Nikolopoulos K: Ten-year follow-up evaluation of a school screening program for scoliosis. Is the forward-bending test an accurate diagnostic criterion for the screening of scoliosis? Spine (Phila Pa 1976)

Source (Country)	No. Screened	Screening Test (Screening Frequency)	% (95% CI)			%		
			PPV	Sensitivity	Specificity	False-Positive Rate	False-Negative Rate	Prevalence of AIS with >10° Cobb Angle
Screening programs with follow-up of screen-negative children								
Yawn et al, 1999[17] (United States)	2,242	FBT +/− scoliometer (annual over multiple years)[a]	29.3 (20.3-39.8)	71.1 (54.1-84.6)	97.1 (96.3-97.7)	2.9	28.9	1.7
Fong et al, 2015[20]	—	—	—	—	—	—	—	—
Lee et al, 2010[22]	—	—	—	—	—	—	—	—
Luk et al, 2010[21] (Hong Kong)	306,082	FBT +/− scoliometer +/− Moiré topography (biennial or more often)	81.0 (80.3-81.7)	93.8 (93.3-94.3)	99.2 (99.2-99.2)	0.8	6.2	3.5
Karachalios et al, 1999[12] (Greece)	2,700	FBT (one time)	17.3 (11.7-24.2)	84.4 (67.2-94.7)	95.2 (94.3-95.9)	4.8	15.6	1.2
	2,700	Scoliometer (one time)	5.3 (3.6-7.6)	90.6 (75.0-98.0)	80.7 (79.1-82.1)	19.3	9.4	1.2
	2,700	Moiré topography (one time)	7.6 (5.3-10.6)	100.0 (84.2 (100)	85.4 (84.0-86.7)	14.6	0	1.2
	2,700	Humpometer (one time)	5.0 (3.4-7.0)	93.8 (79.2-99.2)	78.5 (76.9-80.0)	21.5	6.3	1.2

THE TAKE-HOME MESSAGE

- AIS affects 2% to 4% of 10- to 18-year-olds. Most of these adolescents maintain normal function; nevertheless, unrecognized AIS can result in poor physical and emotional outcomes that could be mitigated with early detection and management of the condition. Early detection through school-based AIS screening programs is highly controversial because of the conflicting evidence and recommendations about the efficacy of school screenings. Consequently, only some states mandate school screenings.
- The current USPSTF recommendation against school screenings is based on outdated and limited data, and therefore it may not provide the validity and reliability necessary to make an informed, evidence-based decision for or against screenings. The forward bend test with scoliometry is an easily accessible and reasonable method of detecting AIS in asymptomatic children.

THANK YOU