



Ideal and Average Values of Thoracic Kyphosis

The ideal Harrison thoracic spine kyphotic model is used as a reference guide to calculate a given patient's percent abnormality of the sagittal thoracic spine. The Harrison thoracic spine model indicates that the thoracic kyphosis can be approximated with a piece of an ellipse from T1-T12. The thoracic kyphosis decreases moving distally. Clinically, we measure the total angle of thoracic spine curvature using lines tangent to the mid-bodies of T3-T10, termed the Absolute Rotation Angle or ARA. While all angles from T1-T12 need to be measured to accurately assess the thoracic curvature, it is more efficient to report to the patient one single value that represents their unique spinal **Subluxation**. To calculate the patient's percent abnormality of thoracic kyphosis, we use three simple steps:

- 1) Take the measured ARA value and divide it by the ideal value,
- 2) Multiply the value obtained above by 100 to get %,
- 3) If the curve is lordotic, then this value is added to 100% to get the % abnormality. If the curve has increased kyphosis then 100% is subtracted from this new value.

On the back is a complete table of percent abnormalities for possible ARA values. In the table below, the Harrison Ideal and Average values of thoracic kyphosis are provided. These values represent the best available evidence and this is an Evidence Based Approach to quantify Subluxation.^{1,2}

References

1. Harrison DE, Janik TJ, Harrison DD, Cailliet R, Harmon S. Can the Thoracic Kyphosis be Modeled with a Simple Geometric Shape? The Results of Circular and Elliptical Modeling in 80 Asymptomatic Subjects. J Spinal Disord Tech 2002; 15(3): 213-220.
2. Harrison DD, Harrison DE, Janik TJ, Cailliet R, Haas JW. Do Alterations in Vertebral and Disc Dimensions Affect an Elliptical Model of the Thoracic Kyphosis? Spine 2003;463-469.

Table 1

Measurement / Level	Average Value	Ideal Value
T2-T3	3.3°	6.8°
T3-T4	5.0°	6.3°
T4-T5	6.5°	5.9°
T5-T6	5.2°	5.5°
T6-T7	6.7°	5.2°
T7-T8	6.2°	5.0°
T8-T9	4.7°	4.8°
T9-T10	3.1°	4.7°
T10-T11	4.4°	4.7°
ARA T3-T10	37°	37.4°
ARA T2-T11	45.1°	49.0°
Sagittal Translation T3-T10		0 mm



Hyper-Kyphotic ARA	% Increased	Hypo-Kyphotic ARA	% Decreased	Lordotic ARA	% Decreased
+38°	2.7%	+37°	0.0%	0°	100%
+39°	5.4%	+36°	2.7%	-1°	102.7%
+40°	8.1%	+35°	5.4%	-2°	105.4%
+41°	10.8%	+34°	8.1%	-3°	108.1%
+42°	13.5%	+33°	10.8%	-4°	110.8%
+43°	16.2%	+32°	13.5%	-5°	113.5%
+44°	18.9%	+31°	16.2%	-6°	116.2%
+45°	21.6%	+30°	18.9%	-7°	118.9%
+46°	24.3%	+29°	21.6%	-8°	121.6%
+47°	27.0%	+28°	24.3%	-9°	124.3%
+48°	29.7%	+27°	27.0%	-10°	127.0%
+49°	32.4%	+26°	29.7%	-11°	129.7%
+50°	35.1%	+25°	32.4%	-12°	132.4%
+51°	37.8%	+24°	35.1%	-13°	135.1%
+52°	40.5%	+23°	37.8%	-14°	137.8%
+53°	43.2%	+22°	40.5%	-15°	140.5%
+54°	45.9%	+21°	43.2%	-16°	143.2%
+55°	48.6%	+20°	45.9%	-17°	145.9%
+56°	51.4%	+19°	48.6%	-18°	148.6%
+57°	54.1%	+18°	51.4%	-19°	151.4%
+58°	56.8%	+17°	54.1%	-20°	154.1%
+59°	59.5%	+16°	56.8%	-21°	156.8%
+60°	62.2%	+15°	59.5%	-22°	159.5%
+61°	64.9%	+14°	62.2%	-23°	162.2%
+62°	67.6%	+13°	64.9%	-24°	164.9%
+63°	70.3%	+12°	67.6%	-25°	167.6%
+64°	73.0%	+11°	70.3%	-26°	170.3%
+65°	75.7%	+10°	73.0%	-27°	173.0%
+66°	78.4%	+9°	75.7%	-28°	175.7%
+67°	81.1%	+8°	78.4%	-29°	178.4%
+68°	83.8%	+7°	81.1%	-30°	181.1%
+69°	86.5%	+6°	83.8%	-31°	183.8%
+70°	89.2%	+5°	86.5%	-32°	186.5%
+71°	91.9%	+4°	89.2%	-33°	189.2%
+72°	94.6%	+3°	91.9%	-34°	191.9%
+73°	97.3%	+2°	94.6%	-35°	194.6%
+74°	100.0%	+1°	97.3%	-36°	197.3%
+75°	102.7%	0°	100.0%	-37°	200.0%
+76°	105.4%				
+77°	108.1%				
+78°	110.8%				
+79°	113.5%				
+80°	116.2%				
+81°	118.9%				