

Comments on the paper "The Influence of Backrest Inclination and Lumbar Support on Lumbar Lordosis" (Andersson et al - Spine Vol. 4 No. 1 Jan/Feb 79).

When a person is sitting fairly upright with lumbar support (e.g. car or office desk), a simple mechanical analysis of sitting would suggest that the lowest lumbar joints (e.g. L5-S1) will be flexed while the upper lumbar joints (e.g. L1-L2) will be hyperextended (in comparison with standing).

This is exactly what is found in the tabulations in this report. (This "double bend" effect is not recognised by the authors although it means that lumbar support is having exactly the opposite effect to that intended).

The relevant tabulations are as follows:

L5-S1	angle in unsupported sitting	53.8°
L5-S1	angle standing	58.4°
L1-L2	angle standing	80.2°

	-2 cms	-0 cms	+2 cms	+4 cms
L1/2	79.6°	76.6	83.7°	85.7°
L5/S1	52.8°	49.2°	53.5°	57.3°

Comparing these with the Table 1 this can be rewritten as follows:

	-2 cms	0 cms	+2 cms	+4 cms
L1/2				
Compared with standing	0.6° flex	3.6° flex	3.5° ext	5.5° ext
L5/S1				
Compared with unsupported sitting	1° flex	4.5° flex	0.3° flex	3.5° ext
L5/S1				
Compared with standing	5.6° flex	9.2° flex	4.9° flex	1.1° flex

Conclusions and comments from these figures:

1. At +2 cms L5/S1 is almost 5° flexed while L1/2 is 3.5° extended.
2. In the second line in table 3 above (L5/S1 compared with unsupported sitting) the application of lumbar support initially flexes L5-S1 even in comparison with unsupported sitting and only reduces the flexion to less than that in unsupported sitting by hyperextending L1-2 in comparison with the standing position.
3. These angles may seem small but these are the instantaneous effect on the spine of lumbar support. The effect will be cumulative with each spell of sitting as the spine distorts in response to the forces on it. The total effect over time will be much greater.
4. Although at +4 cms the L5-S1 joint is extended in comparison with unsupported sitting this is probably only as a result of the hyperextension forces at L1/2 (5.5° hyperextended in comparison with standing). As L1/2 hyperextends plastically (e.g. during a car journey) L5/S1 will flex and the lumbar support will have to be increased to reduce the L5/S1 flexion again. This is exactly the effect found during a car journey where continual increases in lumbar support are required to maintain comfort.
5. The actual situation in practice will probably be much worse as people tend to "collapse" into a car seat and not sit carefully as the subjects probably did in the tests.

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