Dorsoo
Sleep without back pain

SLEEP POLYSOMNOGRAPHIC VARIABLES IN PATIENTS WITH LOW BACK PAIN. A COMPARATIVE STUDY IN TWO DIFFERENT CONDITIONS.

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STUDY DESIGN

Six patients (3 females and 3 males) between 18 and 36 suffering from Low Back Pain, examined by a rheumatologist and documented by Magnetic Resonance Imaging scan, were recorded during two consecutive nights at the Sleep Unit, followed by two nights at home.

Nights of polysomnographic recording were realised at the Sleep Unit of the C.H.U. Brugmann with patients sleeping in a conventional bed (non Dorsoo). Nights (2) at home were recorded on a Dorsoo structure.

The aim was to compare polysomnographic results in both recording situations. It was established that patients would not consume any psychotropic drugs nor analgesics during experimentation time.

Patients also filled in a survey on appreciation-subjectivity of sleep's quality.

STUDIED VARIABLES

A) POLYSOMNOGRAPHIC

- TST: total sleeping time, which means the sum of stage 1+2+3+4+REM.
- SPT: sleep period time, which means the sum of stage 1+2+3+4+REM+awakening phases during the night.
- SOL: time taken until one falls asleep, which means time between light extinction and the first 30 seconds of stage 2 appearance.
- WASO: length of the awakenings during the night.
- EMA: early morning awakening.
- REM lat.: appearance latency of the first phase of paradoxal sleep, which means time between the first 30 seconds of stage 2 and the first 30 seconds of REM stage.
- NSS: number of stage shifts, indicator of sleep stability.
- SEI: sleep efficiency index, which means (TST x 100)/TIB.
- AWAK: awakening amount during the night.
- Percentage stage 1:
- Percentage stage 2:
- Percentage stage 3: length of each stage compared to the percentage of SPT.
- Percentage stage 4:

- Percentage REM:
- ALPHA: measure of chronic parasitical intrusion of Alpha waves (8 to 12 cps) in all stages (1, 2, 3, 4, REM).
- RDI: respiratory disturbance index, which means the number of apnoea and hypopnoea by hour of sleep.
- HR: heart rate during sleep.
- DESAT: desaturation index by hour of sleep.
- MICRO: percentage time of snoring.
- SNORE: snoring.
- PLM: number of periodic leg movements

B) SUBJECTIVES

Subjects filled out a global evaluation survey of satisfaction on a zero to ten scale.

RESULTS

DESCRIPTIVE STATISTICS

For TST 1: first night at the Sleep Unit.
TST 2: second night at the Sleep Unit.

TST 3: first night at home with Dorsoo structure.
TST 4: second night at home with Dorsoo structure.

Non parametric Wilcoxon Signed Ranks Test (Table 1)

TABLE 1. Descriptive statistics of the sleep and subjective variables for de second night in each setting.

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	Mean	Std. Deviation	p<.05
			??
Total Sleep Time			
1	405,50	33,74	
2	387,67	51,41	
Sleep Period Time			
1	434	32,21	
2	415	63,30	
Sleep onset latency			
1	19,17	11,27	
2	14,67	11,13	
Time Awakenings			
1	28,67	21,48	
2	28,00	21,18	
Early Morning Awakening			
1	4	4,34	
2	5,83	6,18	
REM latency			
1	159,83	60,40	
2	103,00	60,63	
Number of Stages Shifts			
1	176,00	89,00	
2	180,17	46,26	

	Mean	Std. Deviation	P< . 05
Sleep Efficiency Index			
1	88,06	5,28	
2	88,98	4,46	
Awakening during the Night			
1	22,00	20,00	
2	13,17	6,21	0,028
Stage 1 (%)			
1	6,65	4,33	
2	7,15	2,82	
Stage 2 (%)			
1	55,31	3,94	
2	51,55	4,07	0,046
Stage 3 (%)			
1	10,58	4,8	
2	10,30	3,22	
Stage 4 (%)			
1	11,96	6,75	
2	11,42	5,07	
Rem (%)			
1	8,85	2,47	
2	11,58	2,21	0,046
Alpha intrusion			
1	977,67	777,21	
2	963,67	824,70	
Respiratory Disturbance Index			
1	4,30	2,50	
2	0,96	1,11	0,024
Micro Awakenings			
1	37,30	21,85	
2	31,15	12,35	
Snoring (%)			
1	5,05	6,75	
2	4,03	4,20	
Subjective Home	6,83	0,75	
Subjective Lab	4,83	1,17	0,026

CONCLUSION

As positive results showing for a significant improvement of sleep on patients suffering from dorsalgia and sleeping on a Dorsoo structure, we firstly have reductions in the number of awakenings during night time. In this respect, the number of awakenings with the Dorsoo structure decreased from 24.7 awakenings during the first night (on a conventional medical structure) to 14 and 13 for the third and fourth night (both on the Dorsoo structure).

As to sleep structure, we have a significant increase of the deep sleep stage 3 and of paradoxal sleep on the Dorsoo structure.

At the same time, we have a significant decrease of light sleep (stage 2), which is positive, when the patients are sleeping on the Dorsoo structure.

Abnormal respiratory events (apnoea and hypopnoea) appear significantly less on the Dorsoo structure. The subjective evaluation, executed with the means of a visual analogic scale, has shown a significant difference between the conventional structure (mean satisfaction value of 4.83/10) and the Dorsoo structure (mean satisfaction value of 6.83/10).

Although we spend around one third of our life lying on beds and mattresses,
and although it is estimated that about half of all Belgians experience at least occasional sleep difficulties, and 9 % serious invalidation problems, there has been relatively little scientific study of beds and mattresses design.

Poor mattresses design can create inappropriate body support, and this in turn may cause muscle discomfort and back pain.

The synergy between the supporting structure and the mattress is thought to be an important factor in reducing and preventing back pain.

Low back pain is very common, costing millions in lost work as well as millions in medical, state and insurance resources every year.

Although the experts may not agree on what is causing the problem, there is a surprising amount of agreement on how best to improve the situation.

Patients with chronic low back pain are to be aware of the posture not only at day but also essentially at night.

The mattress

In a recent study of mattress ergonomics, 12 women tested the difference between lying on an incompressible wooden surfaces and lying on mattresses of various quality.

All mattresses were judged significantly more comfortable than the wooden surfaces, but no significant difference between the various mattress types was determined, even though both orthopaedic and normal mattress designs were included.

Measures of shoulder, elbow, hips, knee, and ankle body contact pressure showed few significant differences, and surprisingly there were no associations between measures and comfort ratings.

How hard or soft a mattress feels is thought to be an important factor in reducing and preventing back pains. Our test results clearly contradict this theory.

Comparison of sleeping on a futon or a softer air mattress showed that sleep onset latency, waking after sleep onset and the sleep efficiency index were comparable for both mattress but subjective sleep evaluations tended to be better for the air mattress.

A study of sleep quality and bed firmness showed that 4 to 9 male subjects slept significantly better on the softer mattress and 2 on the harder one.

If the hardness or softness of the mattress seems not to be a crucial variable, the support of the mattress may be an important element in distributing pressure evenly across the body to help circulation, decrease body movement by discomfort and enhance sleep quality.

Moreover, the tandem bed and mattress may strongly contribute to maintain the spine's natural curves and keep the spine in alignment when subject lays down.

This aim is persued in the Dorsoo system.

So as we can conclude from our results, on subjective evaluation concerning comfort and pain reduction, positive elements appear. On the polysomnographic data we pointed out a reduction in the number of awakenings, an increase in deep sleep and REM sleep with the Dorsoo structure.

SOURCES

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