Journal of Yoga and Physiotherapy
ISSN: 2476-1303

Juniper Publishers
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Research Article
Volume 11 Issue 2 - March 2024
DOI: 10.19080/JYP.2024.10.555809

J Yoga & Physio

Sleeping Position Associated with Well-Being and Mattress Type Linked to Low Back Pain

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Submission: February 26, 2024; **Published:** March 22, 2024

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Abstract

Objective:

To evaluate the relationship of low back pain (LBP) and well-being with sleeping position and mattress type in an adult population.

Design:

A cross-sectional general population survey study.

Settings:

Department of Physical Medicine and Rehabilitation, NOVA, Central Hospital of Central Finland, Jyväskylä and Tampere University of Applied Sciences, Tampere.

Methods:

Subjects were invited to take part in the sleep ergonomic survey by an announcement in a nationally daily newspaper. The online survey was completed using Webropol.

Results:

A total of 6 422 females and 3 694 males aged 18 years or over answered the questionnaires. Morning LBP was reported by almost half of the subjects (43%) and morning back stiffness by significantly more than half (62%). Subjects usually slept on their sides (35%) or side lying and supine (31%). Only a few subjects reported sleeping prone (6%) or solely in a supine position (3%). The remainder (25%) slept in all the major sleeping positions. The occurrence of LBP did not correlate with sleeping position (p=0.06). Subjects sleeping in the supine position more often reported sleeping peacefully, better vitality on awakening and feeling powerlessness less often than those sleeping in the other positions. Subjects sleeping on a Tempur mattress reported significantly less LBP and greater vitality than those sleeping on other types of mattresses. The number of subjects sleeping on spring and foam mattresses was almost equal, while no significant difference was observed in low back symptoms between them. However, subjects sleeping on Tempur mattresses (10%) reported significantly less frequently LBP and stiffness.

Conclusions:

No correlation was found between sleeping position and LBP, but supine position was associated with better well-being. From mattresses only the Tempur correlated with a lower incidence of LBP and well-being.

Keywords: Sleep Ergonomics; Side Lying; Prone; Supine; Spring Mattress; Memory Foam; Tempur

Abbreviations: LBP: Low Back Pain, SD: Standard Deviations, ANOVA: Analysis of Variance

Background

The global point prevalence of low back pain (LBP) has been estimated to be 9.4%. It is one of the most common reasons for visits to primary care physicians and physiotherapists [1]. LBP is one of the leading causes of disability, sick leave, and early

retirement, which, in turn, incur more costs to society than diagnostics and treatment. Approximately 80% of patients have nonspecific LBP, meaning that current diagnostic equipment yields no specific diagnosis [2]. The cause of LBP has been shown to be multifactorial, and thus various treatment approaches may need to be incorporated into patients' care plans [3]. Although one-third of our entire lives is spending asleep in bed, LBP and sleeping ergonomics have been evaluated in only a few studies. This study aimed to evaluate the prevalence and possible associations of LBP with habitual sleeping positions and mattress types in the general population.

Methods

Participants were recruited for the study via an advertisement in a national daily newspaper. The nature and aims of the study were described and data anonymity was guaranteed. Participants were informed that by answering the survey they consented to the use of their data for research purposes. The survey questionnaire comprised 24 items covering demographic data, sleeping position, mattress type, low back symptoms, sleep comfort, and vitality. The questions were formulated using Webropol and answers posted to the web address given in the advertisement. Severity of pain was assessed on the Numerical Rating Scale (range 0-10), with higher scores indicating more severe pain.

Statistical analysis: The descriptive statistics were presented as means with standard deviations (SD) or counts with percentages (%). Statistical comparisons between the groups were made using a chi-square, t-test or analysis of variance (ANOVA), as appropriate. Correlations were estimated by Spearman's correlation coefficient method. A level was set at 0.05 for all tests. Stata 13.1 (StataCorp LP, College Station, TX, USA) statistical package was used for the analyses.

Results

A total of 10 116 people aged 18 years or over answered the questionnaire. Females comprised the majority of the respondents (63%). Most participants were of working age and the age group 26-35 years was the best represented. Only 7.5% were over 65 years. Subjects' demographic data, sleeping position, and mattress type by gender are presented in Table 1. Both genders most often repeated sleeping on their side or on their side and supine (66%) and only a few in the prone position (6%). The three major sleeping positions were reported by 25% of females and 24% of males and only in supine slept 2% and 4% respectively ($p<0.001$). LBP on waking occurred in 63% of subjects with no significant difference between men and women ($p=0.16$). LBP most commonly occurred between ages 26-55. The occurrence of LBP did not correlate with sleeping position ($p=0.06$). However, subjects sleeping supine most often reported sleeping peacefully and were awakened due to an uncomfortable posture or numbness less often than those sleeping in the other positions ($p<0.001$) They also reported better vitality and feeling powerless less often than those sleeping in the other positions ($p<0.001$) (Figure 1).

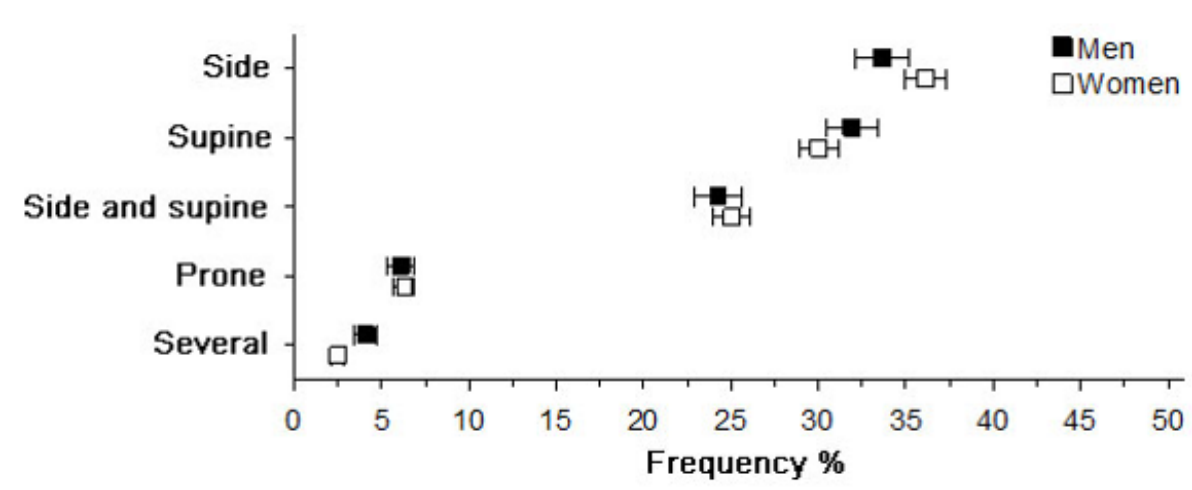

Figure 1: Habitual sleeping position of men and women. Values are expressed as mean and whiskers show 95% confidence intervals.

The most common mattress types were spring (59%) and foam (22%) mattresses. Tempur mattresses were the most common in the foam category, comprising almost half of the total. Another foam mattress (13%) were more often reported by subjects under age 35. Subjects sleeping in all three sleep positions most commonly slept on another foam mattress (27%) and least often on a Tempur mattress (21%). They also more often changed their sleeping position (25%) and more often reported fatigue and

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powerlessness. A Tempur mattress was more often reported as giving a good back support (81%) than any other memory foam (66%), simple foam (41%) or spring (41%) mattress (p<0.001). Waking up due to an uncomfortable posture or numbness was significantly less common among those reporting sleeping on a Tempur (28%) compared to other memory foam (53%), simple foam (57%) or spring (59%) mattress (p<0.001). This is in line with subjects more often reporting that it is easy to find a good sleeping position on a Tempur (83%) than other memory foam (70%), spring (61%) or simple foam (59%) mattress (p<0.001) (Figure 2).

Table 1: Demographic data, sleeping position clinical data, and mattress type reported by participants (N=10 116).

	Foam N=1311	Tempur memory foam N=986	Other memory foam N=1230	Spring N=5918	Other N=671	
Female, N (%)	793 (60)	565 (57)	803 (65)	3808 (64)	453 (68)	<0.001
Age, years, N (%)						<0.001
18-25	276 (21)	36 (4)	58 (5)	433 (7)	79 (12)	
26-35	449 (34)	162 (16)	306 (25)	1433 (24)	161 (24)	
36-55	376 (29)	509 (52)	641 (52)	2758 (47)	263 (39)	
56-65	112 (9)	178 (18)	152 (12)	873 (15)	102 (15)	
66+	98 (7)	101 (10)	73 (6)	421 (7)	66 (10)	
Sleeping position, N (%)						<0.001
Side	435 (33)	344 (35)	429 (35)	2121 (36)	232 (35)	
Side and supine	381 (29)	341 (35)	422 (34)	1778 (30)	185 (28)	
Prone	84 (6)	45 (5)	66 (5)	393 (7)	42 (6)	
Supine	61 (5)	46 (5)	38 (3)	148 (3)	19 (3)	
Several	350 (27)	210 (21)	275 (22)	1478 (25)	193 (29)	
Mattress experienced as giving good back support, N (%)	538 (41)	839 (85)	812 (66)	2427 (41)	348 (52)	<0.001
Waking up due to uncomfortable posture or numbness, N (%)	741 (57)	273 (28)	649 (53)	3521 (59)	348 (52)	<0.001
Easy to find a good sleeping position, N (%)	778 (59)	817 (83)	859 (70)	3593 (61)	429 (64)	<0.001
Often Turning while sleeping, N (%)	1093 (83)	649 (66)	955 (78)	4999 (84)	542 (81)	<0.001
Sleep peacefully, N (%)	510 (39)	643 (65)	539 (44)	2119 (36)	263 (39)	<0.001
Feeling of powerlessness after waking, N (%)	742 (57)	294 (30)	636 (52)	3230 (55)	356 (53)	<0.001
Low back pain after wake up, N (%)	597 (46)	243 (25)	501 (41)	2724 (46)	281 (42)	<0.001
Low back stiffness after waking, N (%)	820 (63)	382 (39)	732 (60)	3996 (68)	389 (58)	<0.001
Low back pain (0-10), mean (SD)	2.6 (3.1)	1.4 (2.5)	2.4 (3.1)	2.6 (3.1)	2.4 (3.1)	<0.001
Vitality, NRS (0-10), mean (SD)	5.6 (2.0)	5.7 (2.1)	5.6 (2.0)	5.5 (2.1)	5.3 (2.0)	<0.001
Feeling of powerlessness after waking N (%)	742 (57)	294 (30)	636 (52)	3230 (55)	356 (53)	<0.001

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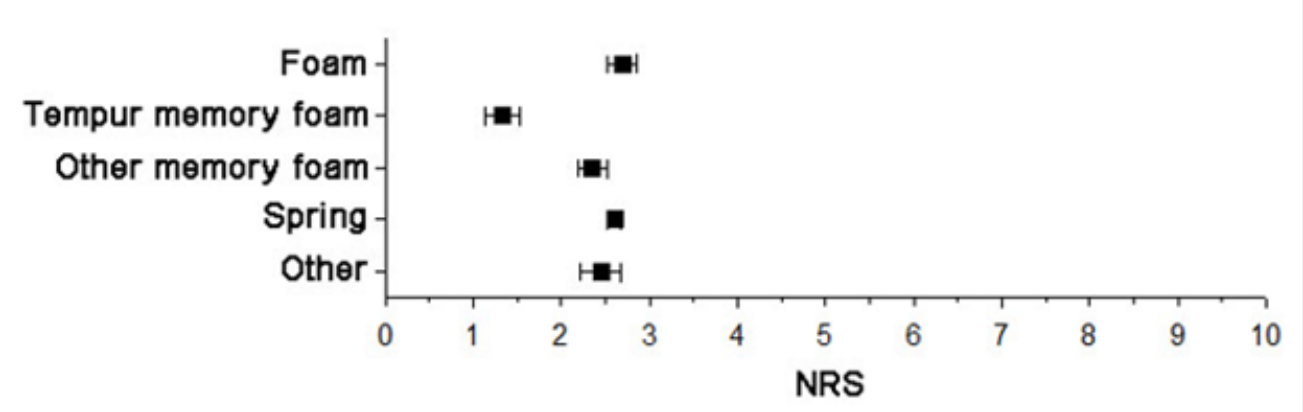

Figure 2: Type of mattress and low back pain measured on the numeric rating scale (NRS). Values are expressed as mean and whiskers show 95% confidence intervals.

LBP was more commonly felt after waking among subjects sleeping on a spring (46%) or simple foam (46%) than other memory foam (41%) or Tempur (25%) mattress ($p<0.001$). This accords with the greater low back stiffness reported by subjects sleeping on a spring (68 %) than on a simple foam (63%) other memory foam (60%) or Tempur (39%) mattress ($p<0.001$). The subjects reported feeling powerlessness more often after sleeping on a simple foam (57%), spring (53%) or other foam (52%) mattress compared to Tempur mattress (30%) ($p<0.001$). Significantly less LBP on the numeric pain rating scale was reported by participants sleeping on a Tempur on average 1.4 (SD 2.5) than on a simple foam 2.6 (3.1) spring 2.6 (3.1) or other memory foam 2.4 (3.1) mattress ($p<0.001$). Vitality 6.5 (2.0) was also significantly better on the NRS in the subjects sleeping on a Tempur compared to simple foam 5.2 (2.0) spring 5.4 (2.0) or other memory foam mattress 5.7 (1.9) ($p<0.001$) (Figure 3).

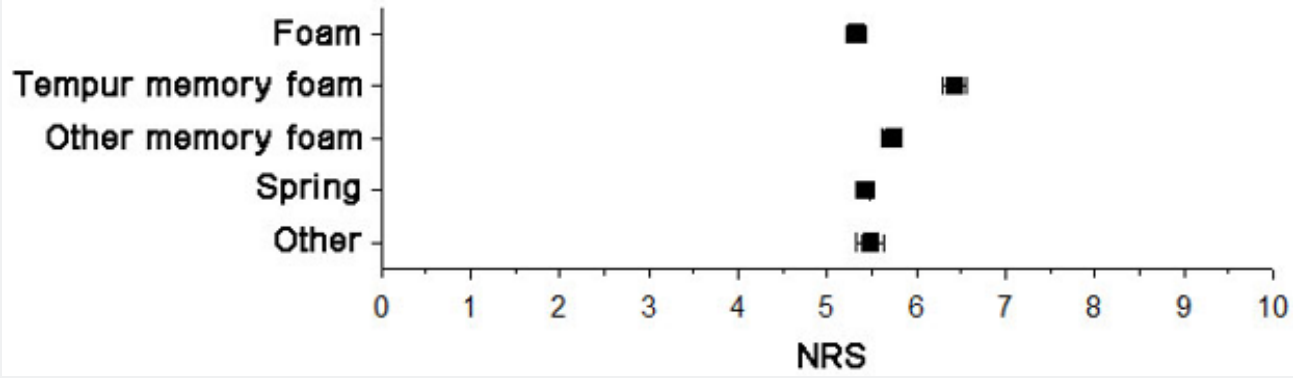

Figure 3: The type of mattress and vitality measured by numeric rating scale (NRS). Values are expressed as mean and whiskers show 95% confidence intervals.

Discussion

As also found in previous research, LBP was common in both genders [1]. Subjects most often slept on their side or on their side and supine, and no significant gender difference was observed. Men more often reported sleeping supine. Sleeping on a memory foam mattress, especially a Tempur mattress, was associated with less frequent as well as less severe LBP and stiffness. These mattress types were also associated with better sleep comfort, reflected in better vitality and less frequent feelings of powerlessness. The fact that the subjects sleeping in all sleep positions most commonly slept on a simple foam mattress suggests that they experienced feelings of discomfort and hence an increased need to change their sleeping position compared to those sleeping on the other types of mattresses. The simple foam mattress was most popular in the youngest age group, probably because of the higher cost of memory foam mattresses.

The present study has several strengths, including the large number of subjects and the use of an internet survey, which

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prevents the pollster from influencing the answers. A limitation of the study is that the subjects were not a random sample drawn from the general population but volunteers who were willing to answer the survey. However, selection bias of this type cannot be avoided even when using random population sampling, as a large proportion of the population selected in this way is unlikely to answer the survey. Spring mattresses were studied as a single group in this study, although like foam mattresses they also differ widely in their sleep ergonomics. Unfortunately, we were unable to differentiate them due to the large number of different brands and difficulty in recalling them. Although the number of studies on mattresses and sleeping position are few, they have shown important associations with LBP [4-6]. Counseling on sleep ergonomics is a drug-free treatment method and may be as important as counseling on work ergonomics in the prevention and treatment of LBP.

Conclusions

LBP was a frequent disorder affecting both genders, but it did not correlate with sleeping position. The most common sleep positions were side or side and supine. Subjects sleeping in the supine position more often reported sleeping peacefully, better vitality on awakening and feeling powerlessness less often than those sleeping in the other positions. Subjects sleeping on a Tempur mattress reported significantly less LBP and greater vitality than those sleeping on other types of mattresses (Appendix).

Acknowledgements:

We thank physiotherapist Samuli Mannonen at Tampere University of Applied Sciences for collecting and saving the data.

Appendix:

Table a: Age and sleeping position by gender (N=10116).

	Female N=6422	**Male N=3694**	
Age (years)			<0.001
18-25	589 (9)	293 (8)	
26-35	1530 (24)	981 (27)	
36-55	2782 (43)	1765 (48)	
56-65	995 (15)	422 (11)	
66+	526 (8)	233 (6)	
Sleeping position (N)			<0.001
Side	2319 (36)	1242 (34)	
Side and supine	1928 (30)	1179 (32)	
Prone	405 (6)	225 (6)	
Supine	160 (2)	152 (4)	
Several	1610 (25)	896 (24)	

Table b: Occurrence of low back pain on waking by gender, age and sleeping position (N=10114).

	Low back pain on waking		
	Yes N=4346	**No N=5768**	
Female	2793 (64)	3628 (63)	0.16
Age, years (%)			0.7
18-25	290 (7)	592 (10)	
26-35	1149 (26)	1362 (24)	
36-55	2049 (47)	2496 (43)	
56-65	570 (13)	847 (15)	
66+	288 (7)	471 (8)	
Sleeping position, N (%)			0.06
Side	1481 (34)	2079 (36)	
Side and supine	1383 (32)	1724 (30)	
Prone	269 (6)	361 (6)	
Supine	119 (3)	192 (3)	
Several	1094 (25)	1412 (24)	

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