Meta-Analysis on the Next-Morning Effects of Hypnotic Drugs on Short- and Long-Term Memory Functioning in Healthy Adults and Elderly

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Background

Sleep medication taken at bedtime may negatively affect next-morning cognitive performance. The aim of these meta-analyses was to determine the effect of hypnotic drugs on next-day short- and long term memory functioning.

Methods

A literature search (Pubmed, Embase, PsycInfo, Scopus, Web of Science, and Cochrane) yielded N=33.969 potentially relevant articles. Studies were included if they assessed next-morning short- or long-term memory after bedtime administration of recommended dosages of hypnotic drugs, were double-blind, placebo-controlled, conducted in healthy volunteers, and sufficient data was reported. Separate analyses were performed for adults (18-65 years old) and elderly healthy volunteers (≥ 65 years old).

i	Std diff in means	Standard error	Variance		Upper limit	Z-Value	p-Value					
ermeeren 2012	2 0,091	0,258	0,067	-0,415	0,598	0,354	0,724	1		+	-	
Otmani 2008	0,958	0,373	0,139	0,227	1,690	2,567	0,010			-	-	-
3lin 2006	0,167	0,334	0,111	-0,488	0,821	0,499	0,618				-	
Meléndez 2005	0,080	0,216	0,047	-0,343	0,503	0,372	0,710			+-	.	
Dye 1989	1,048	0,477	0,227	0,113	1,982	2,197	0,028				-	
Bourin 1987	1,116	0,358	0,128	0,414	1,818	3,114	0,002			- -	-	
Godtilbsen 1986	0,394	0,412	0,170	-0,414	1,202	0,955	0,339			\rightarrow	-	
Bomstein 1985	0,667	0,280	0,078	0,119	1,215	2,384	0,017				++	
	0,427	0,109	0,012	0,212	0,641	3,897	0,000			→	-	
								-2,00	-1,00	0,00	1,00	2,00

Results

In adults, eight studies assessing next-morning short-term memory (after bedtime administration of nitrazepam, triazolam, temazepam, flurazepam, melatonin, zaleplon, lormetazepam, zolpidem), and five studies assessing long-term memory (after bedtime administration of triazolam, nitrazepam, zopiclone, flurazepam, zolpidem) were included in the meta-analyses. The analyses revealed that both next-morning short-term memory (ES = 0.427, p=0.0001; 95%CI: 0.212 to 0.641) and long-term memory (ES = 0.536, p=0.0001; 95%CI: 0.247 to 0.824) were significantly impaired.

In elderly, three studies assessing next-morning short-term memory (after bedtime administration of flurazepam, zolpidem, temazepam), and three studies assessing long-term memory (after bedtime administration of flurazepam, zolpidem, temazepam) were included in the meta-analyses. The analyses revealed that in elderly next-morning short-term memory (ES = 0.412, p=0.019; 95%CI: 0.068 to 0.757) was significantly impaired. No significant impairment was found for long-term memory (ES = -0.038, p=0.825; 95%CI: -0.380 to 0.303).

Study name	Statistics for each study								Std diff in means and 95% CI					
	Std diff in means	Standard error	Variance	Lower limit		Z-Value	p-Value							
31in 2006	1,296	0,367	0,134	0,578	2,015	3,536	0,000	1		1	+	\rightarrow		
Meléndez 2005	0,000	0,302	0,091	-0,591	0,591	0,000	1,000		-		-			
Vermeeren 2002	2 0,578	0,264	0,069	0,062	1,095	2,194	0,028			I —				
Godtilbsen 1986	0,289	0,361	0,130	-0,418	0,996	0,802	0,423			-	_			
Fossen 1983	0,810	0,425	0,180	-0,023	1,642	1,906	0,057					-		
	0,536	0,147	0,022	0,247	0,824	3,636	0,000			-				
								-2,00	-1,00	0,00	1,00	2,00		

Long term memory - effect of hypnotics in healthy subjects

Short term memory - effect of hypnotics in healthy subjects

Conclusion

Sleep medication, when administered in recommended dosages at bedtime, significantly impairs next-morning short- and long term memory functioning