

European Respiratory Society Annual Congress 2013

Abstract Number: 3412

Publication Number: P4011

Abstract Group: 4.2. Sleep and Control of Breathing

Keyword 1: Sleep studies **Keyword 2:** Sleep disorders **Keyword 3:** No keyword

Title: Polysomnographic parameters associated with morning headache

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Body: Introduction: Patients visiting sleep physicians commonly report recurrent morning headaches upon awakening. Published rates of morning headache range from 11 to 60%. Our aim was to look at the prevalence of morning headache in patients undertaking diagnostic sleep studies at 2 sleep study centres in Sydney; and then look at sleep study parameters that are associated with morning headache. Methods: Patients attending for polysomnography volunteered to complete a 2 page questionnaire, asking about the frequency and quality of headaches. These questions included the Headache Impact Test (HIT-6), the International Headache Society (IHS) criteria for sleep apnoea headache, as well as screening for depression, anxiety and chronic pain disorders. Results: Between January and October 2012, 352 patients participated. After excluding 163 patients from analysis due to incomplete surveys, or undergoing polysomnography with CPAP, 109 (57.7% of the remaining 189 patients) reported a history of morning headaches, and 50 patients (26%) had severe headaches as assessed by HIT-6. Those without obstructive sleep apnoea (AHI<5) were more likely to report morning headache (72% vs 53%, p=0.02). Morning headache was also associated with reduced sleep efficiency (73% vs 50%, p=0.003), increased arousals (68% vs 40%, p=0.001) and reduced total sleep time <300minutes (47% vs 22%, p=0.005). Other measured sleep parameters did not reveal any significant associations. Conclusion: In contrast to previous studies, we found that morning headaches were less likely in patients with sleep apnoea, but more likely in those patients with increased arousals, reduced sleep efficiency and reduced total sleep time.