The Association Between Hypertension and Insomnia Among Saudi Population: A Cross-Sectional Study

Sameeha A Fallatah[1], Hoda Jehad Abousad[2*], Ahlam Ghazzai Alhakami[3], Alwaleed Abdullah Aljreas[3], Maram Salim Algrani[3], Anas Mastour Alqarni[4], Razan Amer Thabet[4], Nawaf Hamoud Alamri[4], Abdulaziz Ali Alsaedi[4], Fazzah Basheer Alshammari[5], Norah Salim Rashidi[5], Abdulkarim Souilm Alenzi[6], Saeed Salem Alshehri[6], Salem Ghurman Alshehri[6] and Ibrahim Musaad Alhoshan[7]

[1] Department of Family Medicine, MOH, KAMCJ, Jeddah, KSA, Saudi Arabia

[2] Department of Obstetrics & Gynecology, Master SA, KSA, Saudi Arabia

[3] Medical Service Doctor, MBBS, KSA, Saudi Arabia

[4] Medical Intern, MBBS, KSA, Saudi Arabia

[5] Specialist Nursing, KSA

[6] Nursing, KSA

[7] Medical Student, MBBS, KSA

RESEARCH

Corresponding Author:

Hoda Jehad Abousada

Department of Obstetrics & Gynecology,

Master SA,

KSA, Saudi Arabia

dr.huda1992@outlook.com

ABSTRACT

Objective

To assess the relationship between hypertension and insomnia among the Saudi population.

Methods

The study will employ a cross-sectional design to investigate the association between hypertension and insomnia among the Saudi population. This design allows for the collection of data at a single point in time, offering insights into the relationship between the variables.

Results

The study included 581 participants. The most frequent age among them was 18-28 (n= 266, 45.8 Per Cent), followed by 29-39 (n= 129, 22.2 Per Cent). The most frequent gender among study participants was female (n= 320, 55.1 Per Cent), followed by male (n= 261, 44.9 Per Cent). Study participants' most frequent body mass index was normal 18.5-24.9 kg/m2 (n= 231, 39.8 Per Cent) followed by overweight 25-29.9 kg/m2 (n= 200, 34.4 Per Cent). Marital status among study participants, with most of them being single (n=283, 48.7 Per Cent) followed by married (n= 238, 41 Per Cent). The number of hours of sleep during the day among study participants with most of them had 6-8 hours. Participants were asked if they had difficulty sleeping. There most of the participants were nothing (n= 201, 34.6 Per Cent). On the other hand, 154 participants had middle (26.5 Per Cent). They asked if they had difficulty staying asleep. There most of the participants were nothing (n= 227, 39.1 Per Cent). On the other hand, 152 participants had middle (26.2 Per Cent). Participants were asked if they had trouble waking up early. There most of the participants were nothing (n= 189, 32.5 Per Cent). Followed by middle (n=148, 25.5 Per Cent).

Conclusion

The results of the study showed that most of the study participants were of normal weight according to their body mass index. Most of them are single. Most participants sleep approximately 6-8 hours a day. The largest percentage of participants work in the government or private sector. Most of them had good social contact.

Key Words

Hypertension, Insomnia

Introduction

Hypertension, which is prevalent in 26.4 Per Cent of the global population, is widely recognized as the primary risk factor contributing to death[1]. Insomnia is a frequently reported symptom among those diagnosed with hypertension. Previous studies have shown that persons with hypertension are more likely to have insomnia, with a risk ratio ranging from 1.5 to 3.18 [2,3]. Multiple studies have shown a positive correlation between hypertension in adults and a heightened susceptibility to sleeplessness. However, it is worth noting that individuals diagnosed with hypertension may also have comorbid psychological conditions, including anxiety and depression [4–6], which have been identified as potential risk factors for the development of insomnia. Nevertheless, the existing information does not establish a systematic link between these factors.

Insomnia stands as the prevailing sleep condition globally, ranking as the second most frequent mental disease on a global scale. The condition is characterized by the presence of challenges in beginning sleep (DIS) or experiencing Difficulty in Falling Asleep (DFA), disruptions in Sleep Continuity (SCD) or Difficulties in Sustaining Sleep (DMS), Inadequate Restoration during Sleep (NRS), and rising prematurely in the early morning (EMA) [7–9]. Insomnia symptoms were seen in around 17 Per Cent to 19 Per Cent of the United States population [10]. According to a study conducted in China, around 15 Per Cent of the population reported from insomnia [11].

Insomnia has been shown to be correlated with a range of mental and physical health issues. Furthermore, individuals with atypical sleep patterns may potentially have cardiovascular disorders[12]. The study conducted by Hernandez-Aceituno et al.[13] revealed a substantial correlation between heightened use of antihypertensive drugs and an unfavorable sleep condition. Hence, the management of insomnia and improvement of sleep patterns may play a pivotal role in the regulation of some chronic illnesses.

Hypertension and sleeplessness are significant public health concerns, and there has been a recent surge of interest in exploring the relationship between these conditions [14]. Li et al. conducted a meta-analysis in order to evaluate the combined Relative Risk (RR) of sleeplessness in relation to hypertension. The results indicated that the final relative risk (RR) value was 1.21 (95 Per Cent confidence interval: 1.10 to 1.33) [15]. Nevertheless, the correlation between insomnia and hypertension has shown conflicting results in several epidemiological research [16–19], and there is a dearth of thorough reviews that specifically examine the bidirectional relationship between these two conditions [20].

The research problem addressed in this study is the investigation of the potential association between hypertension and insomnia within the Saudi population. Specifically, the study aims to explore the prevalence and nature of the relationship between these two health conditions, considering the unique cultural, social, and environmental factors that might influence the occurrence of hypertension and insomnia among individuals in Saudi Arabia. Through a cross-sectional study design, the research seeks to examine whether there is a significant correlation between hypertension and insomnia in this population, and if so, to what extent this relationship exists and whether it varies based on demographic or lifestyle factors. This research problem contributes to a better understanding of the interplay between cardiovascular health and sleep disturbances within the context of the Saudi population, which can potentially inform public health interventions and strategies for improved well-being and healthcare management.

Methods

Study design

The study will employ a cross-sectional design to investigate the association between hypertension and insomnia among the Saudi population. This design allows for the collection of data at a single point in time, offering insights into the relationship between the variables.

Study approach

The study will be conducted in various regions of Saudi Arabia, including urban and rural areas, to ensure a representative sample that captures the diversity of the Saudi population.

Study population

The target population will consist of adult individuals (18 years and older) residing in Saudi Arabia. Individuals from various socioeconomic backgrounds, ethnicities, and geographic locations will be included to ensure a diverse and representative sample.

Study sample

A convenience sampling approach will be employed to recruit participants. Potential participants will be approached in community settings, health clinics, and educational institutions. The sample size will be determined based on statistical considerations to ensure sufficient power to detect potential associations.

Study tool

For the current study, a questionnaire was adopted for data collection, also categorized as a study tool.

Data collection

Data will be collected using structured interviews and self-administered questionnaires. Trained interviewers will administer the questionnaires to ensure standardized data collection.

Data analysis

Descriptive statistics will be used to summarize the demographic characteristics of the sample. The association between hypertension and insomnia will be analyzed using appropriate statistical methods, such as chi-squared tests or logistic regression. Potential confounding variables (e.g., age, gender, lifestyle factors) will be controlled for in the analysis.

Ethical considerations

Participants will be eligible if they are Saudi nationals aged 18 years and older and willing to provide informed consent to participate in the study. Individuals with a history of severe medical conditions that may affect the study outcomes will be excluded.

Results

The study included 581 participants. The most frequent age among them was 18-28 (n= 266, 45.8 Per Cent) followed by 29-39 (n= 129, 22.2 Per Cent). Figure 1 shows the age distribution among study participants. The most frequent gender among study participants was female (n= 320, 55.1 Per Cent) followed by male (n= 261, 44.9 Per Cent). Figure 2 shows the age distribution among study participants. The most frequent body mass index value among study participants was normal 18.5-24.9 kg/m2 (n= 231, 39.8 Per Cent) followed by overweight 25-29.9 kg/m2 (n= 200, 34.4 Per Cent). Figure 3 shows the distribution of BMI among study participants.

Marital status among study participants, with most of them had single (n= 283, 48.7 Per Cent) followed by married (n= 238, 41 Per Cent). Figure 4 shows the marital status distribution among study participants [41-50].

The number of hours of sleep during the day among study participants with most of them had 6-8 hours. Perceived hours of sleep are presented in Figure 5.

Participants were asked if they had difficulty sleeping. There most of the participants were nothing (n= 201, 34.6 Per Cent). On the other hand, 154 participants had middle (26.5 Per Cent). And they asked if they had difficulty staying sleeping. There most of the participants were nothing (n= 227, 39.1 Per Cent). On the other hand, 152 participants had middle (26.2 Per Cent). Participants were asked if they had trouble waking up early. There most of the participants were nothing (n= 189, 32.5 Per Cent). Followed by middle (n=148, 25.5 Per Cent) [21-31].

Participants were asked if they had diseases. Their responses and results are presented in Table 1.

Discussion

The present review aimed to examine the correlation between individuals exhibiting symptoms of sleeplessness at the first assessment and the subsequent development of hypertension. A comprehensive analysis was conducted, including a total of twenty independent investigations, which together included a substantial sample size of 242,415 participants. Among the 20 studies examined, hypertension was determined by the assessment of blood pressure measurements, self-reported instances of hypertension, or the use of antihypertensive therapy. Four separate research used a sleep questionnaire to assess individuals for the presence of insomnia. Among these studies, one employed the Women's Health Initiative Insomnia Rating Scale (WHIIRS), while the other four studies utilized the DSM-IV, ICSD-1, and ICD-9/10 criteria instead. A total of seventeen investigations were carried out in the regions of North America and Europe, while three research were undertaken in Asia [31-41]. The duration of the follow-up period spans from one to twenty years.

Conclusion

The results of the study showed that most of the study participants were of normal weight according to their body mass index. Most of them are single. Most participants sleep approximately 6-8 hours a day. The largest percentage of participants work in the government or private sector. Most of them had good social contact.

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[3] Medical Service Doctor, MBBS, KSA, Saudi Arabia

[4] Medical Intern, MBBS, KSA, Saudi Arabia

[5]Specialist Nursing, KSA

[6]Nursing, KSA

[7]Medical Student, MBBS, KSA

Tables & Figures

Table 1: Diseases among study participants.

| scale item	yes	no
Do you have Hypertension?	120	461
	20.70 Per Cent	79.30 Per Cent
Do you have Diabetes?	97	484
	16.70 Per Cent	83.30 Per Cent
Do you have heart disease?	68	513
	11.70 Per Cent	88.30 Per Cent
Do you have respiratory system diseases?	91	490
	15.70 Per Cent	84.30 Per Cent
Do you have kidney disease?	44	537
	7.60 Per Cent	92.40 Per Cent
Do you have bone diseases and arthritis?	89	492
	15.30 Per Cent	84.70 Per Cent
Do you have Thyroid disease?	59	522
	10.20 Per Cent	89.80 Per Cent
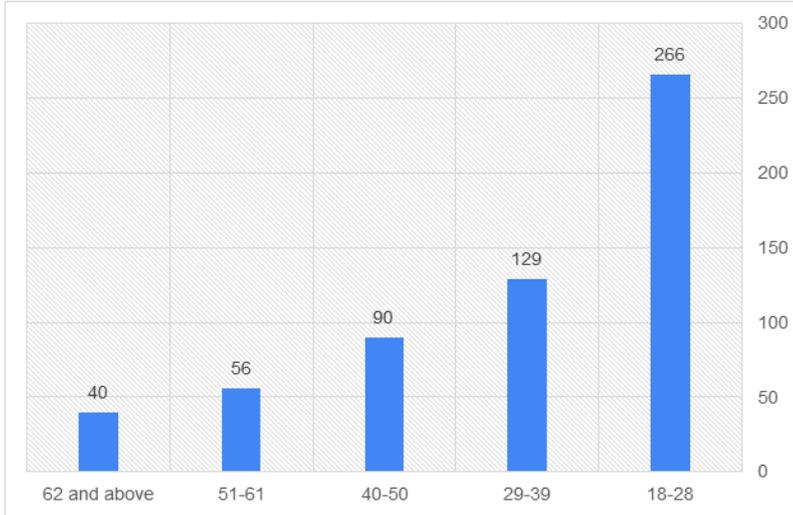
Figure 1: Age distribution among study participants.
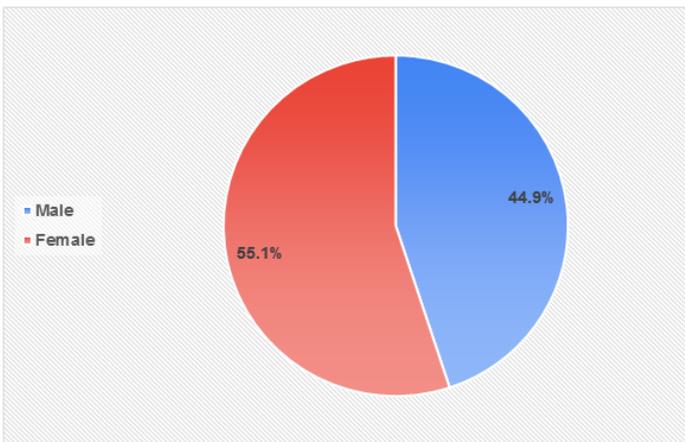
Figure 2: Gender distribution among study participants.
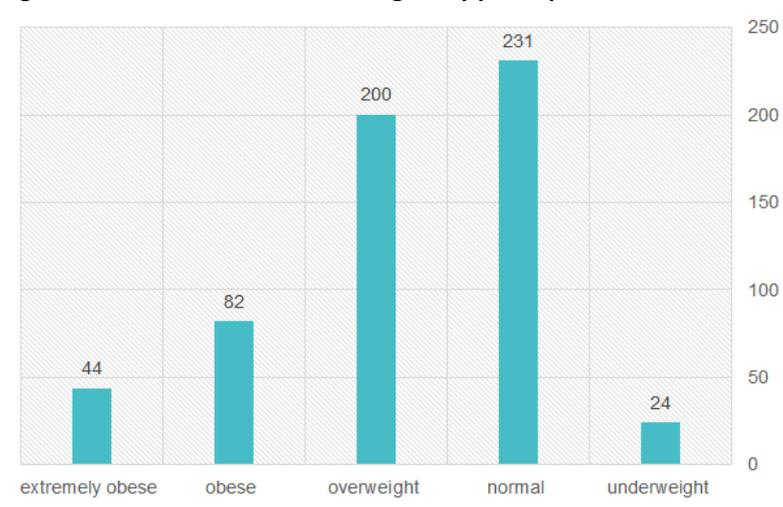
Figure 3: BMI distribution among study participants.
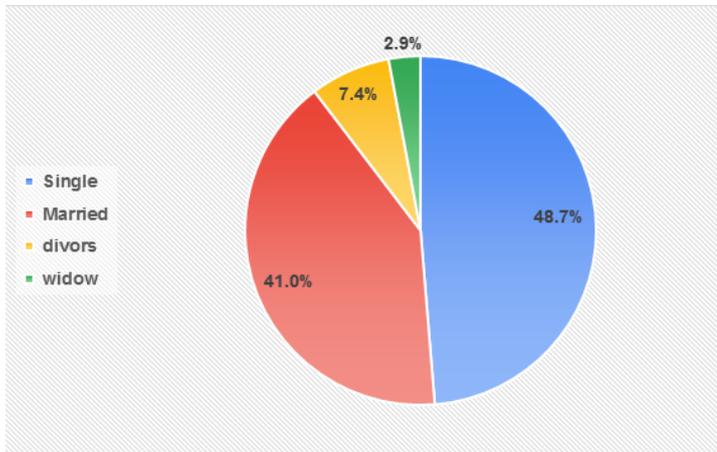
Figure 4: Marital distribution among study participants.
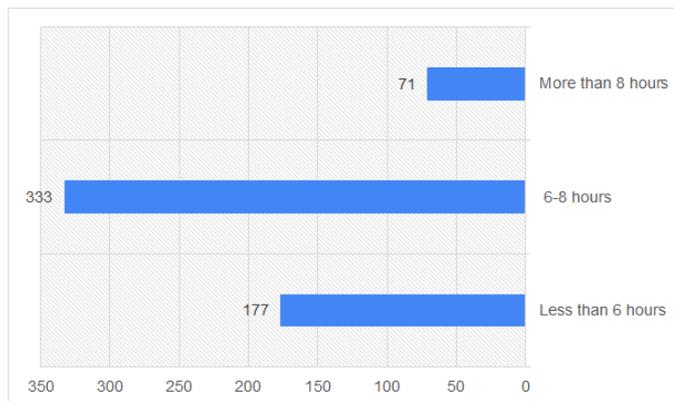
Figure 5: Hours of sleep distribution among study participants.

ANNEXURE 1: Data Collection Tool

1. **How old are you?**
- **18-28**
- **29-39**
- **40-50**
- **51-61**
- **62 and above.**

2. **What is your gender?**
- **Male**
- **Female**

3. **What is your educational level?**
- **Uneducated**
- **The school**
- **The university**

4. **What is your marital status?**
- **Single**
- **Married**
- **divorced**
- **widow**

5. **What is your job?**

- **Student**
- **Unemployed**
- **Private job**
- **Government or private sector employee**
- **retired**
- **other**

6. **Do you have Hypertension?**
- **Yes**
- **No**

7. **Do you have Diabetes?**
- **Yes**
- **No**

8. **Do you have heart disease?**
- **Yes**
- **No**

9. **Do you have respiratory system diseases?**
- **Yes**
- **No**

10. **Do you have kidney disease?**
- **Yes**
- **No**

11. **Do you have bone diseases and arthritis?**
- **Yes**
- **No**

12. **Do you have Thyroid disease?**
- **Yes**
- **No**

13. **How many hours do you sleep during the day?**
- **Less than 6 hours**
- **6-8 hours**
- **More than 8 hours**

14. **Do you have difficulty sleeping?**
- **Nothing**
- **Light**
- **Middle**
- **Intense**
- **Very strong**

15. **Do you have difficulty staying asleep?**
- **Nothing**
- **Light**
- **Middle**
- **Intense**
- **Very strong**

16. **Do you have trouble waking up early?**
- **Nothing**
- **Light**
- **Middle**
- **Intense**

- **Very strong**

17. **How satisfied/dissatisfied about your current sleeping pattern?**
- **Very dissatisfied**
- **Not satisfied**
- **neutral**
- **satisfied**
- **Very satisfied**

18. **To what extent is your sleep a problem with your daily performance?**
- **Not at all**
- **A little**
- **To some extent**
- **A lot**
- **Too much**

19. **To what extent do you think a sleep problem is noticeable to Others in terms of impairing your quality of life?**
- **Not noticeable at all**
- **Barely**
- **Moderately**
- **Quite a lot**
- **Too much**

20. **How worried/ sad you are about your current sleep problem?**
- **Not at all**
- **A little**
- **To some extent**
- **A lot**
- **Too much**

APPENDIX 2: Participants responses to scale items

scale item	yes	no
	120	461
Do you have Hypertension?	20.7 Per Cent	79.3 Per Cent
	97	484
Do you have Diabetes?	16.7 Per Cent	83.3 Per Cent
	68	513
Do you have heart disease?	11.7 Per Cent	88.3 Per Cent
	91	490
Do you have respiratory system diseases?	15.7 Per Cent	84.3 Per Cent
Do you have kidney disease?	44	537

	7.6 Per Cent	92.4 Per Cent
	89	492
Do you have bone diseases and arthritis?	15.3 Per Cent	84.7 Per Cent
	59	522
Do you have Thyroid disease?	10.2 Per Cent	89.8 Per Cent

Age	Frequency	Percent
18-28	266	45.8 Per Cent
29-39	129	22.2 Per Cent
40-50	90	15.5 Per Cent
51-61	56	9.6 Per Cent
62 and above	40	6.9 Per Cent

BMI	frequency	percent
underweight (<18)	24	4.1 Per Cent
normal (18.5-24.9)	231	39.8 Per Cent
overweight (25-29.9)	200	34.4 Per Cent
obese (30-34.9)	82	14.1 Per Cent
extremely obese (>35)	44	7.6 Per Cent

Dependent Variable Encoding	
Original Value	Internal Value
yes	0
no	1

Gender	Frequency	Percent
Male	261	44.9 Per Cent
Female	320	55.1 Per Cent

Marital status	Frequency	Percent
Single	283	48.7 Per Cent
Married	238	41.0 Per Cent
divorce	43	7.4 Per Cent

widow	17	2.9 Per Cent

Hours of sleep	Frequency	Percent
Less than 6 hours	177	30.5 Per Cent
6-8 hours	333	57.3 Per Cent
More than 8 hours	71	12.2 Per Cent

Work	Frequency	Percent
Student	128	22.0 Per Cent
Unemployed	95	16.4 Per Cent
Private job	46	7.9 Per Cent
Government or private sector employee	241	41.5 Per Cent
retired	51	8.8 Per Cent
other	20	3.4 Per Cent

Blood pressure	Frequency	Percent
Low	3	0.5 Per Cent
Normal	533	91.7 Per Cent
Height	45	7.7 Per Cent

Educational level	Frequency	Percent
Uneducated	21	3.6 Per Cent
The school	49	8.4 Per Cent
The university	511	88.0 Per Cent

How satisfied/dissatisfied about your current sleeping pattern?		
Very dissatisfied	201	34.6 Per Cent
Not satisfied	139	23.9 Per Cent

neutral	154	26.5 Per Cent
satisfied	60	10.3 Per Cent
Very satisfied	27	4.6 Per Cent

To what extent is your sleep a problem with your daily performance?		
Not at all	94	16.2 Per Cent
a little	126	21.7 Per Cent
to some extent	184	31.7 Per Cent
a lot	125	21.5 Per Cent
Too much	52	9.0 Per Cent

To what extent do you think a sleep problem is noticeable to Others in terms of impairing your quality of life?		
Not noticeable at all	65	11.2 Per Cent
Barely	157	27.0 Per Cent
Moderately	129	22.2 Per Cent
Quite a lot	205	35.3 Per Cent
Too much	25	4.3 Per Cent

How worried/ sad you are about your current sleep problem?		
Not at all	173	29.8 Per Cent
A little	94	16.2 Per Cent
To some extent	166	28.6 Per Cent
A lot	117	20.1 Per Cent
Too much	31	5.3 Per Cent

scale item	yes	no
Do you have Hypertension?	120	461
	20.7 Per Cent	79.3 Per Cent

		97	484
Do you have Diabetes?		16.7 Per Cent	83.3 Per Cent
		68	513
Do you have heart disease?		11.7 Per Cent	88.3 Per Cent
		91	490
Do you have respiratory system diseases?		15.7 Per Cent	84.3 Per Cent
		44	537
Do you have kidney disease?		7.6 Per Cent	92.4 Per Cent
		89	492
Do you have bone diseases and arthritis?		15.3 Per Cent	84.7 Per Cent
		59	522
Do you have Thyroid disease?		10.2 Per Cent	89.8 Per Cent

Survey item	Nothing	Light	Middle	Intense	Very strong
	201	139	154	60	27
Do you have difficulty sleeping?	34.6 Per Cent	23.9 Per Cent	26.5 Per Cent	10.3 Per Cent	4.6 Per Cent
	227	115	152	58	29
Do you have difficulty staying asleep?	39.1 Per Cent	19.8 Per Cent	26.2 Per Cent	10.0 Per Cent	5.0 Per Cent
	189	134	148	72	38
Do you have trouble waking up early?	32.5 Per Cent	23.1 Per Cent	25.5 Per Cent	12.4 Per Cent	6.5 Per Cent

Nominal Regression

Case Processing Summary			
		N	Marginal Percentage
pressure.level	1	3	0.5 Per Cent
	2	533	91.7 Per Cent
	3	45	7.7 Per Cent
Valid		581	100.0 Per Cent
Missing		0	
Total		581	
Subpopulation		75[a]	
a. The dependent variable has only one value observed in 58 (77.3 Per Cent) subpopulations.			

Model Fitting Information				
	Model Fitting Criteria	Likelihood Ratio Tests		
Model	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	203.741			
Final	133.164	70.577	6	0.000

Pseudo R-Square	
Cox and Snell	0.114
Nagelkerke	0.251
McFadden	0.200

Likelihood Ratio Tests				
	Model Fitting Criteria	Likelihood Ratio Tests		
Effect	-2 Log Likelihood of Reduced Model	Chi-Square	df	Sig.
Intercept	371.803	238.639	2	0.000
Difficulty sleep	137.266	4.102	2	0.129
Difficult stay sleep	136.943	3.779	2	0.151
Trouble wakeup early	139.570	6.406	2	0.041

Parameter Estimates								95 Per Cent Confidence Interval for Exp(B)	
Pressure level[a]		B	Std. Error	Wald	df	Sig.	Exp(B)	Lower Bound	Upper Bound
1	Intercept	1.036	1.556	0.443	1	0.505			
	Difficulty sleep	0.049	0.696	0.005	1	0.944	1.050	0.268	4.107
	Difficult stay sleep	-0.650-	0.757	0.738	1	0.390	0.522	0.118	2.300
	Trouble wakeup early	-0.756-	0.652	1.342	1	0.247	0.470	0.131	1.687
2	Intercept	6.063	0.595	104.012	1	0.000			
	Difficulty sleep	-0.427-	0.225	3.606	1	0.058	0.652	0.420	1.014
	Difficult stay sleep	-0.399-	0.213	3.499	1	0.061	0.671	0.441	1.019
	Trouble wakeup early	-.426-	0.176	5.835	1	0.016	0.653	0.462	0.923
a. The reference category is: 3.									