



Sleep Quality and Related Factors in Hemodialysis Patients



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Sleep Quality and Related Factors in Hemodialysis Patients



Introduction

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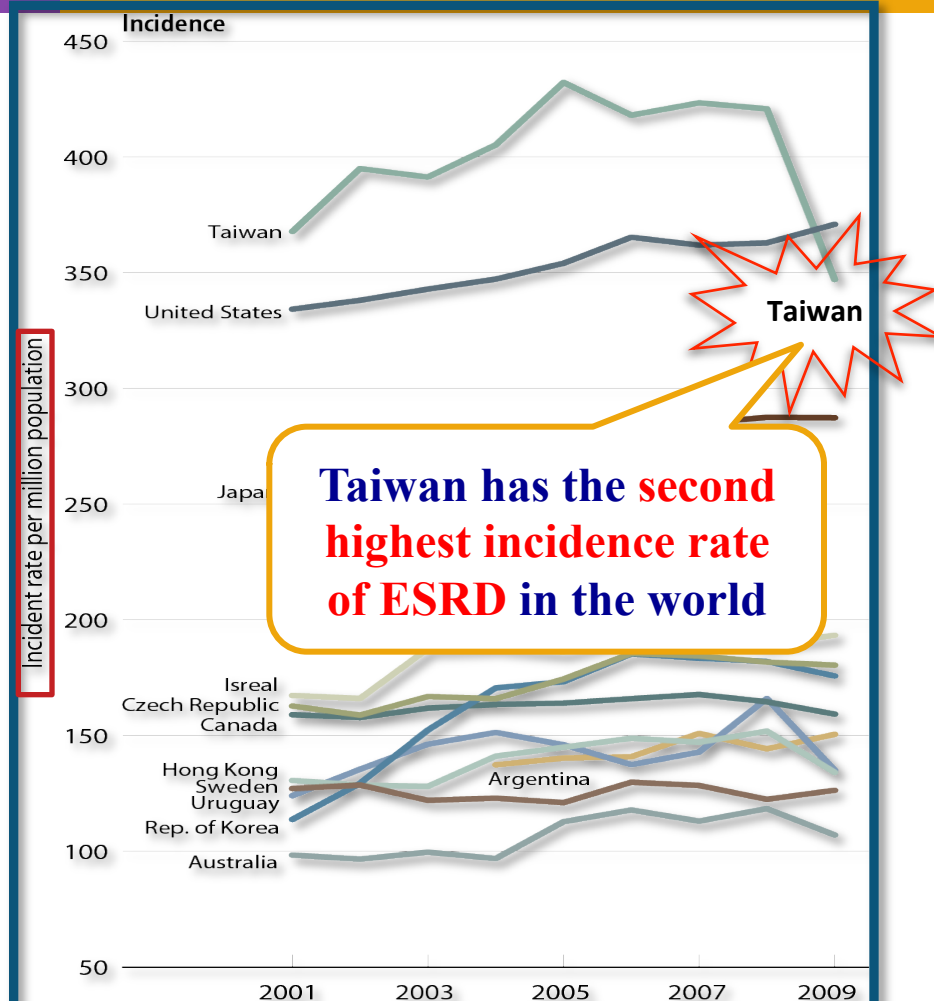
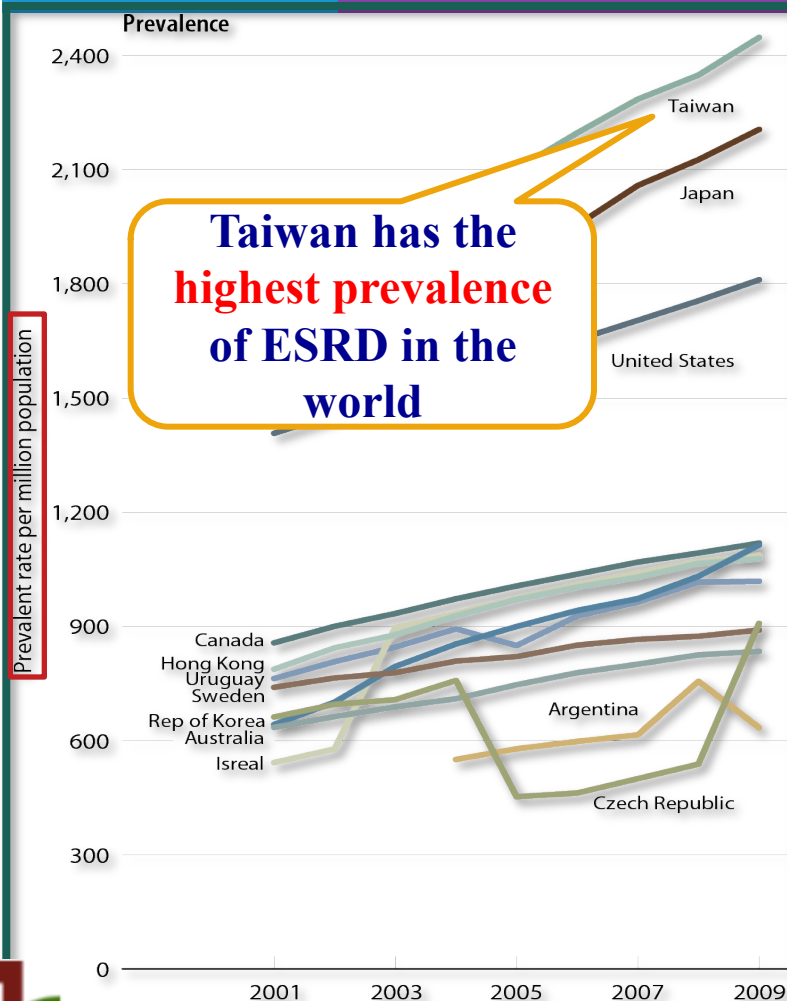
Introduction



- ❖ Sleeping problems affect 50%~80% in hemodialysis patients. (Basto et al., 2007; Chen et al., 2006)
- ❖ Sleep quality is an important predictor of health status, quality of life and survival rate. (Elder et al., 2008)
- ❖ There were few research showing the influential factors related to sleep quality in Taiwanese hemodialysis patients.



Comparison of unadjusted ESRD Prevalence & incidence worldwide





Sleep Quality and Related Factors in Hemodialysis Patients



Research Purpose

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Sleep Quality and Related Factors in Hemodialysis Patients



The purpose of the study was to investigate **sleep quality and related factors** in hemodialysis patients from a **holistic perspective**.



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Research Framework

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Definition of Terms



❖ Hemodialysis Patients

➤ Diagnosed **ESRD** by a nephrology doctor and receiving
hemodialysis therapy

❖ Regular Use Hypnotic Agents

➤ Participants who had regular **regularly used hypnotics more than
3 times per week** to aid sleep..

❖ Physical Status

➤ **RLS, EDS, high risk of SA and laboratory data** (BUN,
Creatinine, Albumin, Hb, Phosphate)

❖ Mental Status

➤ **Depression**



Sleep Quality and Related Factor in Hemodialysis Patients Framework



Essential Attributes

Demographics

Age (years)
Sex
Smoking
Drinking
Hypnotic agents

Illness Characteristics

Hemodialysis duration
Dialysis shift
Kt/V
Comorbidity

Physical Status

RLS, EDS, high risk of SA
Laboratory data
(BUN, Creatinine, albumin, Hb, P)

Mental status

Depression

Sleep quality
in hemodialysis patients





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Material and Methods

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Material and Methods



Study Design

- ❖ Cross-sectional, purposive and correlation design.
- ❖ Sample Size: $n=170$ (01/03/2011~30/04/2011)
 - Subject were recruited from outpatient hemodialysis centers of 2 medical centers in Taipei City.
- ❖ Ethical considerations
 - Before starting this study, researchers obtained IRB approvals from the administrative departments of both medical centers.
 - Participants signed a written consent form and confidentiality of responses was assured.



Material and Methods



Participants population (*Inclusion Criteria*)

- ☑ Diagnosed with ESRD by nephrologist.
- ☑ Hemodialysis patient 20 years of age or older and mentally competent.
- ☑ Every week receives two or three convention hemodialysis treatments for three or more months.
- ☑ Can communicate in Mandarin or Taiwanese languages.
- ☑ Patient or caregiver is willing to participate in the study and sign the consent form.



Material and Methods



Participant Population (*Exclusion Criteria*)

- ❌ Hospitalized hemodialysis patient within the past month.
- ❌ Hemodialysis patient had mental disturbance, blindness or dementia.
- ❌ Hemodialysis patient refuses to be interviewed or to fill out questionnaires.



Material and Methods



❖ Participants answered structured questionnaires including:

➤ **Demographic** questionnaire

➤ International restless legs scale (**IRLS**): **RLS** (Yes/No)

➤ Epworth sleepiness scale (**ESS**) : **EDS** (Yes/No)

➤ **Berlin's Questionnaire**: **Risk for sleep apnea** (Yes/No)

➤ The Beck depression inventory-II (**BDI-II**): **Depression** (Yes/No)

➤ Chinese version of the Pittsburgh sleep quality index (**CPSQI**):

Sleep quality (Good /Poor)

❖ **Illness characteristics** and **laboratory data** from dialysis centers

Material and Methods



- ❖ Statistical Analysis: SPSS, version 18.0
 - A p value of < 0.05 was considered statistically significant.
- ❖ Descriptive statistic (frequency/percentage/mean $\pm$ SD)
- ❖ Inferential statistic
 - Chi-square (χ^2) test or independent t-test
 - Stepwise regression: Find the most important sleep quality variables in hemodialysis patients
 - Hierarchical logistic regression (combined with stepwise regression procedure): find out the most important independent predictor factors in hemodialysis patient





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Results

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Results



❖ Demographic characteristics of participants

➤ Data was collected from March 2011 to April 2011 (N=170)

- 1) The mean age of the participants was 62.6 years (SD, 14.56 years)
 - 2) The sample consisted of 88 men (51.2%) and 82 women (48.2%)
 - 3) 10.6% of the participants smoked cigarettes
 - 4) Alcohol consumption was extremely low (5.9%)
 - 5) 35.3% of participants had regularly used hypnotics to aid sleep
- (Table1)



Table 1 Demographic characteristics of the sample(n=170)

Characteristic	Category	n	%	Range	Mean	SD
Age(years)	20~30	5	2.9%	20-91	62.58	14.56
	31 ~40	6	3.5%			
	41~50	24	14.1%			
	51~60	46	27.1%			
	61~70	37	21.8%			
	71~80	32	18.8%			
	≥ 81	20	11.8%			
Sex	Female	82	48.2%			
	male	88	51.2%			
Smoking	No	152	89.4%			
	Yes	18	10.6%			
Drinking alcohol	No	160	94.1%			
	Yes	10	5.9%			
Hypnotic	No	110	64.7%			
	Yes	60	35.3%			

Elderly person

1/3
Hypnotic



Table 2 illness characteristics of the sample (n=170)

Characteristic	Category	n	%	Range	Mean	SD
Dialysis duration				0.25-23.25	5.13	4.44
	3 months~1year	30	17.6%			
	>1 year~10years	113	66.5%			
	>10years	27	15.9%			
Dialysis shifts						
	Morning	53	31.2%			
	Afternoon	57	33.6%			
	Evening	60	35.3%			
Kt/V index				0.65~2.63	1.65	0.33
Comorbidity	0	23	13.5%			
	1	44	25.9%			
	2	60	35.3%			
	≥3	43	25.3%			

dialysis shifts
(morning, afternoon
and evening) are
almost equality



Results



❖ Clinical manifestations of hemodialysis patients

- 41.8% of participants had high risk for sleep apnea
- 34.1% of participants had daytime sleepiness
- 19.4% of participants had restless legs syndrome (Table 3)

❖ Distribution of participant characteristics by laboratory data

The mean BUN of the participants was 82.3 (SD, 20.7)mg/dl

The mean creatinine of the participants was 11.21 (SD, 2.8)mg/dl

The mean hemoglobin of the participants was 10.31(SD, 1.8)g/dl

The mean albumin of the participants was 4.1 (SD,0.7)g/dl

The mean phosphate of the participants was 5.3 (SD,1.7)mg/dl(Table4)

❖ Distribution of participant characteristics by mental status

- 44.1% of participants had depression (Table 5)



Table 3 Clinical manifestation of hemodialysis patients (N=170)



Variables	Category	N	%	Rank
Risk for sleep apnea	No	99	58.2%	
	Yes	71	41.8%	1
Daytime sleepiness	No	112	65.9%	
	Yes	58	34.1%	2
Restless legs	No	137	80.6%	
	Yes	33	19.4%	3



Table 4 Laboratory data distribution (N=170)



Variables	Category	Range	Mean	SD
Laboratory data				
	BUN	26~150	82.34	20.71
	Creatinine	1~25	11.21	2.79
	Hb	6.9~14.3	10.32	1.79
	Albumin	2.7~7.6	4.06	0.65
	Phosphate	1.7~10.9	5.29	1.69



Table 5 Mental status in hemodialysis patients (n=170)



Characteristic	Category	N	%	Range	Mean	SD
Depression scale (BDI-II)				0-56	14.23	13.52
	0~13 (Normal)	95	55.9			
	14~19 (Mild depression)	21	12.4			
	20~28 (Moderate depression)	27	15.9			
	29~63 (Major depression)	27	15.9			

44.1% have depression





Sleep Quality and Related Factors in Hemodialysis Patients



Distribution of Sample Characteristics by Sleep Status

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Results



Table 6 : hemodialysis patients' essential attributes and sleep quality (n=170)

The number of hemodialysis patients who needed **hypnotics to aid sleep** was statistically **significant**

	Good sleepers CPSQI≤5	Poor sleepers CPSQI>5	P-Value
	N(%)	N(%)	
Age < 64	24(58.5%)	74(57.4%%)	0.895
≥ 65	41(41.5%)	129(42.6%)	
Sex Female	20(48.8)	62(48.1%)	0.936
Male	21(51.2%)	67(51.9%)	
Don't smoke cigarettes	38(92.7%)	115(89.1%)	0.511
Smoke cigarettes	3(7.3%)	14(10.9%)	
Don't drink alcohol	38(92.7%)	122(94.6%)	0.654
Drink alcohol	3(7.3%)	7(5.4%)	
Don't require hypnotics	34(82.9%)	122(94.6%)	0.005**
Require hypnotics	7(7.3%)	7(5.4%)	

CPSQI = The Chinese version of the Pittsburgh Sleep Quality Index; p<0.001 **p<0.01 *p<0.05

Results



Table 7: hemodialysis patients' essential attributes and sleep quality (n=170)

Hemodialysis duration,
dialysis shift, spKt/V,
comorbidity were not
statistically significant

	Good sleepers CPSQI≤5	Poor sleepers CPSQI>5	P-Value
	N(%) /mean± SD	N(%) /mean± SD	
Hemodialysis duration (year)	5.24±4.79	5.04±4.39	0.803
Dialysis shift			
Morning	13(31.7%)	40(31.0%)	0.775
Afternoon	12(29.3%)	45(34.9%)	
Evening	16(39.0%)	44(34.1%)	
spKt/V	1.69± 0.32	1.64± 0.33	0.442
Comorbidity	1.73±1.21	1.84±1.18	0.594



Results



Table 8 : hemodialysis patients' physical status and sleep quality (n=170)

RLS, EDS, risk of sleep apnea,
BUN, Hb were statistically
significant

	Good sleepers CPSQI≤5	Poor sleepers CPSQI>5	P-Value
	N(%) / mean± SD	N(%) / mean± SD	
Non RLS	39(95.1%)	98(76%)	0.006**
RLS	2(4.9%)	31(24.0%)	
Non EDS	35(85.4%)	77(59.7%)	0.002**
EDS	6(14.6%)	52(40.3%)	
Low risk of sleep apnea	37(90.2%)	80(62.0%)	<0.001***
High risk of sleep apnea	4(9.8%)	49(38.0%)	
Blood urea nitrogen (BUN)mg/dl	87.88±19.40	80.57±20.87	0.049*
Hemoglobin (Hb)g/dl	10.74± 1.06	10.19± 1.19	0.009**
Albumin (g/dl)	4.17±0.71	4.03± 0.62	0.217
Phosphate (mg/dl)	5.11±1.96	5.35±1.60	0.427

Results



Table 9: hemodialysis patients' mental status and sleep quality (n=170)

The number of hemodialysis patients who had depression was statistically significant

	Good sleepers CPSQI $\leq$ 5 N(%)	Poor sleepers CPSQI $>$ 5 N(%)	P-Value
Non Depression	32(78.0%)	63(48.8%)	<0.001***
Depression	9(22.0%)	66(51.2%)	

CPSQI= The Chinese version of the Pittsburgh Sleep Quality Index; $p<0.001$ ** $p<0.01$ * $p<0.05$



Table 10 Univariable logistic regression of sleep quality in hemodialysis patients



Predictor Variables	(B)	S.E.	Wald	p	Exp(β)	95% CI
Hypnotic v.s non Hypnotic	1.220	0.452	7.286	0.007**	3.387	1.397-8.214
RLS vs. non RLS	1.819	0.754	5.827	0.016**	6.168	1.408-27.024
EDS vs. non-EDS	1.317	0.477	8.264	0.004**	3.939	1.547-10.032
High risk for SA vs. Low risk for SA	1.734	0.557	9.706	0.002**	5.666	1.903-16.870
BUN	-0.017	0.009	3.795	0.051	0.983	0.966-1.000
Hb	-0.419	0.165	6.499	0.011*	0.657	0.476-0.908
Depression vs. Non- Depression	1.315	0.416	9.974	0.002**	3.725	1.647-8.425

Hemodialysis patients' sleep quality was related to hypnotic drug use, RLS, EDS, high risk of SA, HB, depression

$p < 0.001$ ** $p < 0.01$ * $p < 0.05$





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Predictor Model for Sleep Quality in Hemodialysis Patients

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Table11: Predictors of Sleep Quality in Hemodialysis Patients



Predictor Variables	(B)	S.E.	Exp(β) (odd ratio)	p	Cox& Snell R^2	Nagelkerke R^2
Model 1 (Essential attribute) Hypontic drug V.S non-Hypontic drug ($\chi^2=8.56$, $p=0.003$; Hosmer- Lemeshow=0.000 , $p < 0.001$)					0.049	0.073
Model 2 (add Physical status) $\uparrow \Delta R^2$ change 70% ($\chi^2=29.96$, $p < 0.001$; Hosmer- Lemeshow=10.75, $p=0.216$)					0.162	0.242
Model 3 (add Physical status Mental status) $\uparrow \Delta R^2$ change12% ($\chi^2=34.599$, $p < 0.001$; Hosmer- Lemeshow=5.58, $p=0.694$)					0.184	0.275

(N=170)

The increase in $R^2(\Delta R^2)$ was computed to determine the relative contributions of each variable in the model.



Table 12 Predictors of Sleep Quality in Hemodialysis Patients



Predictor Variables	(B)	S.E.	Exp(β) (odd ratio)	p	Cox & Snell R^2	Nagelkerke R^2
Model 1 (Essential attribute)					0.049	0.073
Hypnotic drug V.S non-hypontic drug						
Hypnotic	1.220	0.452	3.387	0.007**		
Constant	0.804	0.206	15.199	<0.001***		
Model 2 (Add Physical status) $\uparrow \Delta R^2$ change 70%					0.161	0.241
Hypnotic drug v.s non-hypontic drug						
Hypnotic drug	1.10	0.489	2.996	0.025*		
RLS vs. non-RLS						
RLS	1.829	0.776	6.225	0.018*		
EDS vs. non-EDS						
EDS	1.048	0.501	2.852	0.037*		
Hb	-0.445	0.183	0.641	0.015*		
Constant	5.005	1.937	149.19	0.010**		

1. There was a very large R^2 change when the RLS, EDS, Hb variables were added to the model.
2. The overall model fit was still good ($p < 0.05$)
3. Physical status and hypnotic drug use were significant predictors of sleep quality.

$p < 0.001$ ** $p < 0.01$ * $p < 0.05$

Table13 Predictors of Sleep Quality in Hemodialysis Patients



Predictor Variables	(B)	S.E.	Exp(β) (odd ratio)	p	Cox& Snell R ²	Nagelkerk R ²
Model 3(Add Mental status) $\uparrow \Delta R^2$ change 12%					0.184	0.275
Hypnotic vs. Non-Hypnotic						
Hypnotic	1.084	0.498	2.956	0.030*		
RLS vs. Non-RLS						
RLS	1.595	0.790	4.074	0.044*		
EDS vs. Non-EDS						
EDS	1.022	0.580	2.779	0.044*		
Hb	-0.397	0.185	0.672	0.032*		
Depression vs. Non-Depression						
Depression	0.936	0.448	2.550	0.037*		
Constant	4.218	1.973	67.931	0.033*		

1. 27.5% of the model 3 in sleep quality was explained by all the variables considered.
2. Hypnotic, RLS, EDS, HB, and depression were significant predictors of sleep quality in hemodialysis patients.



Sleep Quality and Related Factors in Hemodialysis Patients



Conclusion

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Predictors of Sleep Quality in Hemodialysis Patients



- ❖ With increase of **hypnotic drug use by 1 odds ratio**, the tendency of poor sleep quality will increase as much as **2.956 times**.
- ❖ With increase of **RLS by 1 odds ratio**, the tendency of poor sleep quality will increase as much as **4.074 times**.
- ❖ With increase of **EDS by 1 odds ratio**, the tendency of poor sleep quality will increase as much as **2.779 times**.
- ❖ With increase of **Hemoglobin by 1 odds ratio**, the tendency of poor sleep quality will increase as much as **0.672 times**.
- ❖ With increase of **depression by 1 odds ratio**, the tendency of poor sleep quality will increase as much as **2.550 times**.



Conclusion



- ❖ There were 41(24.1%) hemodialysis patients with good sleep quality ($\text{CPSQI} \leq 5$), and 129 (75.9%) hemodialysis patients had poor sleep quality ($\text{CPSQI} > 5$).
- ❖ The worst sleep component for hemodialysis patients was sleep latency. Secondary components were sleep duration, subjective sleep quality, sleep efficiency, sleep disturbance, use of sleeping medication, and daytime dysfunction.
- ❖ Poor Sleep quality correlated with hemodialysis patients who had hypnotic drug, RLS, EDS, Hb, BUN, and depression.
- ❖ Hypnotic drug, RLS, EDS, Hb, and depression were the significant predictors of sleep quality.



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Implications for Future Research

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Implications for future research



Evidence-based and appropriate nursing interventions will be developed to improve sleep quality for hemodialysis patients.

Sleep Quality and Related Factors in Hemodialysis Patients



So that's a little about our research.

I hope you found it helpful.

Thank you very much!

Are there any questions?





Sleep Quality and Related Factors in Hemodialysis Patients



Question & Comment

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