#### THE INTERNATIONAL CONFERENCE Is snoring in obese women a health concern?

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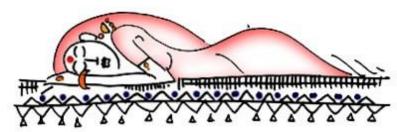
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Snoring as a continuum to sleep apnea

**Gender Differences** Health concerns

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Evidence Conclusions

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40% population (subjective)

Collapse of the pharyngeal airway either due to abn upper airway anatomy &/or neural regulation → vibration soft

tissue → harsh sound

May herald underlying upper airway resistance syndrome

(UARS) or obstructive sleep apnea hypopnea syndrome







## Snoring and Implications

Prior to 1970 1970's

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Nuisance to Precursor to bed partner sleep apnea

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Nonapneic snoring

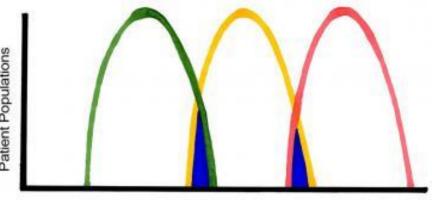
Increased upper airway Resistance (UARS) (Sleep fragmentation,

Arousal from sleep)

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Snorers

**UARS** 

OSA

Guilleminault C et al. A cause of excessive daytime sleepines: the UARS. Chest 1993;104:781-787

#### THE INTERNATIONAL CONFERENCE THE INTERNATIONAL CONFL THE INTERNATIONAL CONFI Contributing factors

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Nasal Congestion

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ropharynx - long uvula

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Alcohol and Drugs

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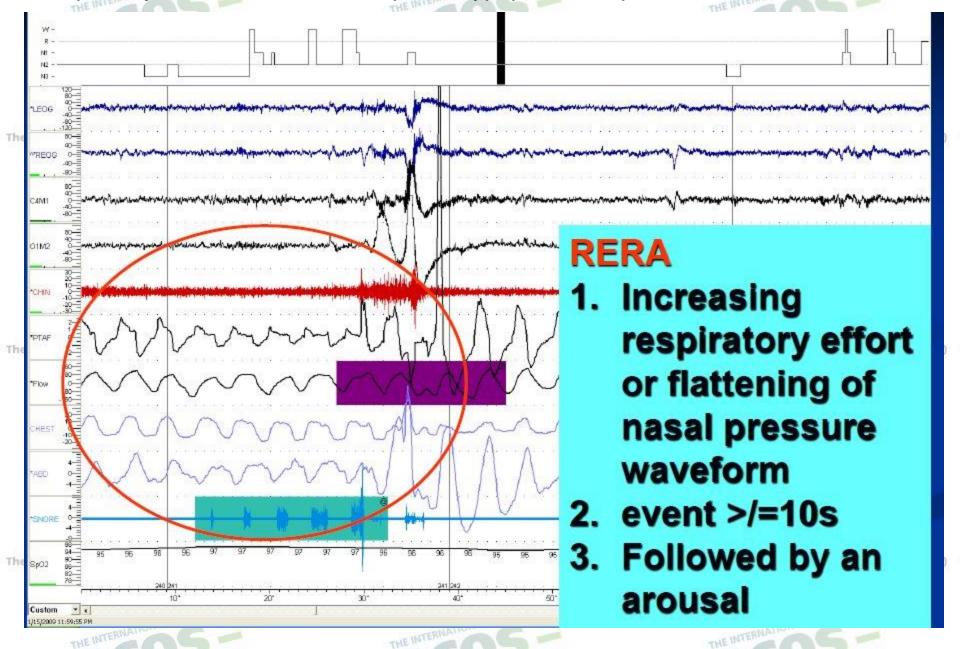


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#### Respiratory disturbance index – Apnea+hypopnea+Resp event related arousal





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5-15 events/hour: Mild OSAHS (UARS)

15-30: Moderate OSAHS

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# In comparison to men:

The Androg	Apneic snorers	Nonapneic snorers/UARS	onal)
20	Common after menopause	Higher prevalence post menopause	
The Androg	Higher BMI for the same level of RDI	Functional – somatic manifestations commoner (insomnia, headaches, IBS)	anal)
20	Delayed diagnosis commoner (incurring higher costs to healthcare)		
	Thyroid dysfunction higher		
The Androg			ınal)

Boccabella et al. How Do Sleep-Related Health Problems Affect Functional Status According to Sex? J Clin Sleep Med. 2017 May 15;13(5):685-692



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	Men	Women	
	Higher fat distribution around the neck	Obesity higher but fat distribution different and hence incidence lesser	
Th	Larger pharynx but more collapsible	Smaller, stiffer	al)
	Less muscle tone in upper airway	Hormonal effect protects (but replacement doesn't always help)	

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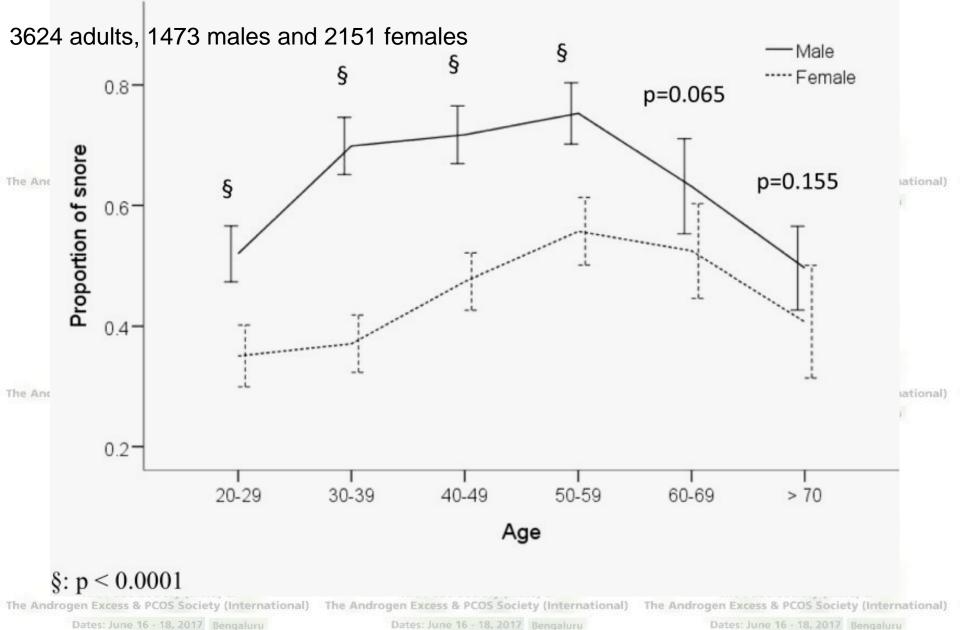
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The proportion of men and women remains statistically significant in each age group up to age 50 to 59 years

Chuang et al

#### THE INTERNATIONAL CONFERI THE INTERNATIONAL COM Adverse health concerns

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DM (X2 commoner compared to nonsnorers)

Hypertension

Cardiovascular diseases

Cerebrovascular diseases

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Osteoporosis/Low bone density

With UARS – all daytime functioning issues – sleepiness, psychomotor issues etc

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Snoring and diabetes often increase during pregnancy, after the menopause and in women with Polycystic Ovary syndrome. THE INTERNATIONAL!

### DM - Nurses' Health Study

69,852 women were included in the final analysis for the 1986–1996 follow-up period.

Dates: June 16 - 18, 2017  THE INTERNATIONAL CONFE		No. of cases	Person- years of follow- up	Relative r	Bengaluru				
PCOS UNRAVEL ENIG				Adjusted for age		Adjusted for age and body mass index		Multivariate adjusted†	ING NA
Jointly Organized I: The PCOS Society (Inc ne Androgen Excess & PCOS Socie Dates: June 16 - 18, 2017				RR‡	95% CI‡	RR	95% CI	RR	y lia) & ety (Internation Bengaluru
THE INTERNATIONAL CONFE	No snoring	237	176,679	1.00§		1.00		1.00	IENG.
UNRAVEL	Occasional snoring	1,297	428,686	2.12	1.85, 2.44	1.48	1.29, 1.70	1.41	MA
Jointly Organized t The PCOS Society (Inc e Androgen Excess & PCOS Socie	Regular snoring	423	58,915	4.99	4.31, 5.96	2.25	1.91,	2.03	y lia) & ety (Internation
Dates: June 16 - 18, 2017	p for trend			<0.0001		<0.0001		<0.0001	Bengaluru

Delaimy et al. Snoring as a Risk Factor for Type II Diabetes Mellitus: A Prospective Study. Am J Epidemiol (2002) 155 (5): 387-393.

#### **Snoring and Cardiovascular Disease Risk**

**Table 2.** Relative Risks (95% Confidence Intervals) of Coronary Heart Disease and Stroke According to Self-Reported Snoring at Baseline in 1986

La Table	recording to ben reported bhoring at baseline in 1700							
Jointly The PCOS Androgen Excess 8		Frequency of Snoring						
Dates: June		Never	Occasionally	Regularly				
	Total cardiovascular events (coronary heart disease + stroke)**							
THE INTERNAT	# cases	162	729	151				
	Person-years	143,719	356,530	51,292				
W-0152	Age-adjusted	1.0	1.46 (1.23–1.74)	2.02 (1.62–2.53)				
UNIT	Multivariate	1.0	1.20 (1.01–1.43)	1.33 (1.06–1.67)				
Jointly	Fatal cardiovascular events							
The PCOS adrogen Excess 8	# cases	31	156	30				
Dates: June	Age-adjusted	1.0	1.61 (1.10–2.38)	2.07 (1.25–3.43)				
	Multivariate	1.0	1.33 (0.90–1.96)	1.35 (0.80–2.26)				
THE INTERNAT	Coronary heart disease							
DC	# cases	102	441	101				
THE PERSON NAMED IN	Age-adjusted	1.0	1.43 (1.15–1.77)	2.18 (1.65–2.87)				
EER	Multivariate*	1.0	1.11 (0.89–1.39)	1.33 (1.00–1.77)				
Jointly	Total stroke							
The PCOS undrogen Excess 8	# cases	60	288	50	i			
Dates: June	Age-adjusted	1.0	1.60 (1.21–2.12)	1.88 (1.29–2.74)	2			
	Multivariate	1.0	1.42 (1.07–1.89)	1.35 (0.91–1.99)				
	COMPENSATION	MOS VA		COMPENSA				

Hu et al. Snoring and Risk of Cardiovascular Disease in Women. J Am Coll Cardiol 2000;35:308-13

### Cardiovascular Risk estimate

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Association between sleep disordered breathing and incident coronary heart disease or heart failure stratified by sex in all participants (n = 1,280).

AHI		Overall			Women			Men		Interaction Significance
1. Categorical	HR	CI	Р	HR	CI	Р	HR	CI	P	
0	Ref			Ref			Ref			
$> 0$ to $\leq 5$	1.5	(0.9, 2.5)	0.11	2.8	(0.98, 8.1)	0.054	1.1	(0.6, 1.9)	0.85	0.096
5 to ≤ 15	1.8	(1.0, 3.2)	0.044	4.6	(1.5, 14.6)	0.01	1.1	(0.5, 2.1)	0.85	0.035
15 to ≤ 30	1.2	(0.6, 2.5)	0.57	3.7	(0.8, 15.8)	0.08	8.0	(0.3, 1.7)	0.52	0.056
≥ 30	2.3	(1.1, 4.8)	0.02	3.8	(0.6, 23.7)	0.15	1.7	(0.8, 3.8)	0.17	0.21
										Overall F-test of all interaction terms P = 0.18
2. Continuous	1.1	(0.98, 1.3)	0.10	1.4	(1.0, 1.9)	0.04	1.1	(0.9, 1.3)	0.49	0.21
3. Log <sub>2</sub> AHI	1.1	(1.0, 1.2)	0.055	1.3	(1.0, 1.5)	0.018	1.1	(0.9, 1.2)	0.35	0.14

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Hla et al. Coronary heart disease incidence in sleep disordered breathing: the Wisconsin Sleep Cohort Study. SLEEP 2015;38(5):677–684.



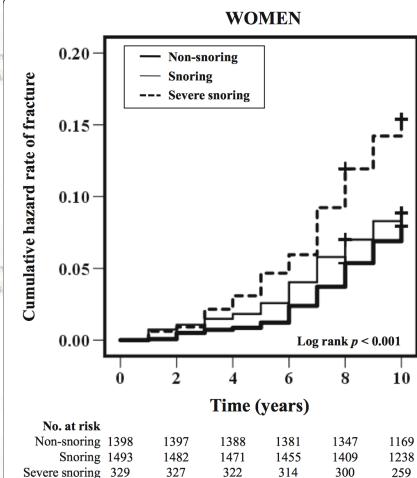
Risk of fragility fractures

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**Fig. 2** The cumulative hazard rates of fractures and the log rank values for the non-snoring, snoring, and severe snoring groups in women

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Choi et al. Increased fragility fracture risk in Korean women who snore: a 10-year population- based prospective cohort study. BMC Musculoskeletal Disorders (2017) 18:236







Misra et al. Consensus Statement for Diagnosis of Obesity, Abdominal Obesity and the Metabolic Syndrome for Asian Indians and

Recommendations for Physical Activity, Medical and Surgical Management. J Assoc Physicians India 2009.

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Normal BMI: 18.0-22.9 kg/m<sup>2</sup>

Overweight: 23.0-24.9 kg/m<sup>2</sup>

Obesity: >25 kg/m<sup>2</sup>

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## Conclusions

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There is no unequivocal evidence for definite causal The Androgen Exe

association between snoring and vascular diseases.

Functional impairment including anxiety, depressi

commoner in women snorers. The Androgen Excess & PCOS Society (International)

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Snoring provides window of opportunity to look for metabolic syndrome/inv further.

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