



New Prognostic Factor for Sudden Sensorineural Hearing Loss

Shih-Wei Wang, MD¹; Ning-Chia Chang, MD, PHD^{1,2}; Kuen-Yao Ho, MD^{1,2}; Ling-Feng Wang, MD^{1,2}; Hui-Li Liu, PHD³; Chen-Yu Chien*, MD, PHD^{1,2}

¹Department of Otolaryngology—Head and Neck Surgery, Kaohsiung Medical University Hospital

²Faculty of Medicine, College of Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan

³Department of Medical Sociology and Social Work, Kaohsiung Medical University, Taiwan

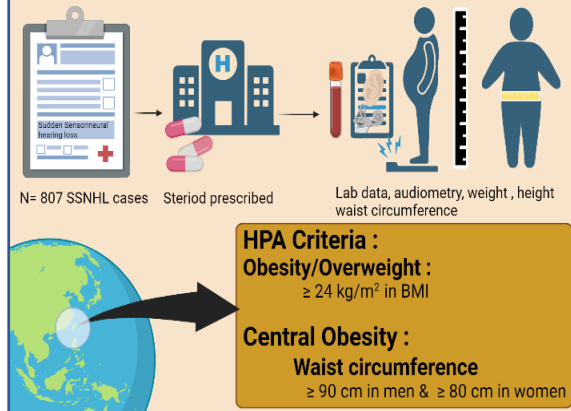


Introduction

- Hearing loss and obesity are growing global public health^[1-5].
- Obesity**, which is an independent risk factor for age-related hearing loss, has been proposed as a predisposing factor for SSNHL (sudden sensorineural hearing loss)^[2].
- Body mass index (BMI) has been widely used to define obesity; However, BMI does not distinguish body distribution.
- Central obesity**, characterized by relatively high abdominal fat distribution, has been associated with higher risk of mortality, independent of BMI^[3,6].
- People with normal BMI but large waist circumference (WC) are at greater risk for vascular related disease, and higher mortality rate^[6].
- Most of the literatures evaluate obesity and hearing loss using the criteria from WHO, the cutpoints were generated mostly from White population^[2-3]; hence, this study used the criteria that suits Taiwanese.
- This study has two objectives:
 - Does obesity affect SSNHL prognosis? [using Taiwan's HPA (Health Promotion Administration) cutoff points for obesity/overweight]
 - Does central obesity affect SSNHL prognosis in patients who were normal in BMI?

Methods and Materials

- Retrospectively investigated 807 cases of SSNHL from January of 2008 to August of 2019 from the Department of Otorhinolaryngology at Kaohsiung Medical University Hospital in Taiwan.
- All the patients were admitted for 7 days, and received complete steroid treatment.
- Lipid profile was collected, MRI (Magnetic Resonance Imaging) was done to exclude cerebellopontine angle tumors.
- Hearing thresholds were measured at 5 frequencies (0.25, 0.5, 1, 2, and 4 kHz) in both ears for each subject (initial and post treatment followed up).
- The prognosis of SSNHL followed the criteria from *Kanzaki et al.*^[7], and was further categorized into 2 groups as "good" and "poor".
- BMI was calculated by dividing body weight in kilograms by squared height in meters (kg/m²); WC was measured at the level of the mid-point between the inferior border of the ribs and the upper margin of the iliac crest.
- To investigate the role of obesity/overweight and normal weight central obesity (NWCO) in the prognosis of SSNHL using cutoff point for Taiwanese.



Conclusion

- No significant impact on the prognosis of sudden sensorineural hearing loss was observed based solely on BMI as an indicator of obesity/overweight.
- Here we describe a new factor that affect the prognosis of SSNHL, NWCO was significantly associated with the recovery of SSNHL relative to NWNCO.

Acknowledgment

- The figures were created by Biorender
- Supported by *Kaohsiung Medical University Hospital* grant KMUH111-1M41

References

- Chien CY et al. *Otolaryngol Head Neck Surg.* 2015;153:105-111.
- Kim SH et al. *Acta Otolaryngol.* 2016 Oct;136(10):1046-50.
- Zhang C et al. *Circulation.* 2008;117(13):1658-1667.
- Hwang JH et al. *Obesity.* 2009;17:1796-1801.
- Lee JS et al. *PLoS One* 2015 Apr 10;10(4):e0122496.
- Owolabi EO et al. *J Health Popul Nutr.* 2017 Dec 28;36.
- Kanzaki J et al. *Auris Nasus Larynx* 2003;30:123Y 7

Hypothesis 1: Does obesity affect SSNHL prognosis ?

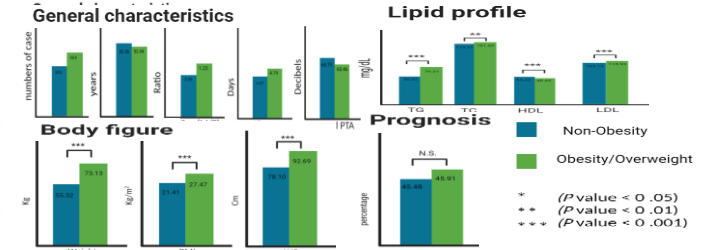
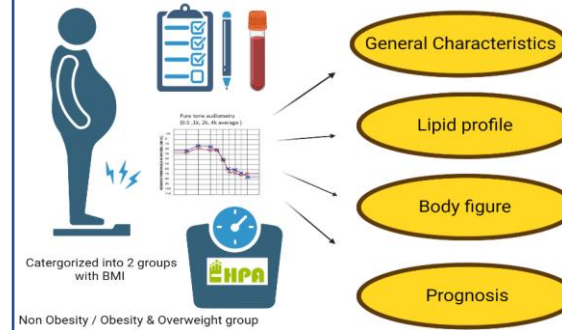


Fig 1. The general characteristics of all subjects (N = 807) in the Non-Obesity and Obesity/Overweight groups. Abbreviations: BMI, body mass index; M, male; F, female; PTA, pure tone audiometry; TG, triglycerides; TC, total cholesterol; HDL, high density lipoprotein cholesterol; LDL, low density lipoprotein cholesterol; WC, waist circumference

Results

- TG, TC, and LDL levels were all significantly higher in the obesity/overweight group; HDL levels, were lower in the obesity/overweight group. However, lipid parameters recorded didn't significantly affect SSNHL prognosis on multivariate analysis.
- Favorable prognosis rate in the nonobese and the obese/overweight groups were 45.48% and 45.91%, respectively, without a significant difference (P = .9048).
- Multivariate logistic regression revealed that BMI ≥ 24 kg/m² (adjusted odds ratio = 1.00, 95% CI = 0.948-1.062, P = .9165) wasn't significantly associated with SSNHL recovery.
- Multivariate logistic regression revealed only time to treatment (adjusted OR = 1.08, 95% confidence interval [CI] = 1.032-1.147, P = .0018) were significantly associated with the prognosis of SSNHL

Hypothesis 2: Does Central obesity affect SSNHL prognosis in normal BMI patients ?

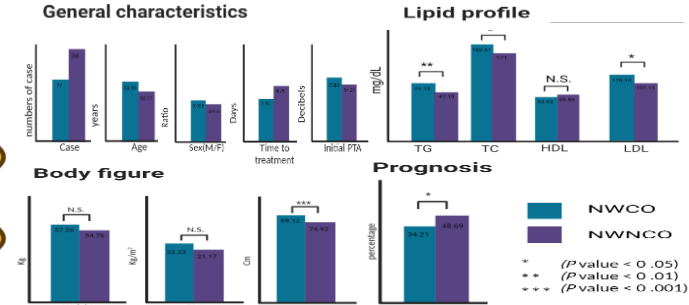
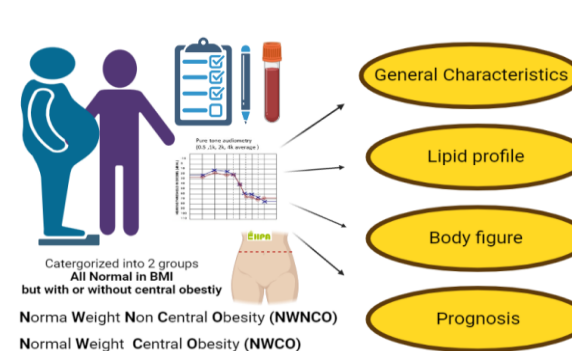


Fig 2. The general characteristics of all subjects (N = 343) in the Non-Obesity and Obesity/Overweight groups. Abbreviations: NWCO, normal weight central obesity; NWNCO, normal weight non central obesity

Results

- Favorable prognosis rates in the NWCO and the NWNCO were 34.21% and 48.69%, respectively and showed significantly (p < 0.05).
- Multivariate logistic regression revealed NWCO (adjusted OR = 2.51, 95% CI = 1.292-5.019, p = .0075), initial hearing loss severity (adjusted OR = 1.01, 95% CI = 1.005-1.021, p = .0014), and vertigo (adjusted OR = 2.13, 95% CI = 1.253-3.688, p = .0058) were significantly associated with SSNHL prognosis.