Incidence and Risk of Alcohol Use Disorders by Age, Gender and Poverty Status: A Population-Based-10 Year Follow-Up Study

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Abstract

Background:

To investigate the association between low-income and alcohol use disorders (AUD) among different age and gender groups.

Methods and Findings:

Data were collected from the national health insurance research database. Participants were divided into 0-17, 18-44, 45-64, and ≥65 age groups. AUD was assessed based on the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). Cox proportional hazard regression analyses were made based on gender, age, and low-income. AUDs were more common in the 18-64 age categories of low-income individuals, that is, 2.32% in men aged 45-64 and 0.65% in women aged 18-44. The hazard ratios (HRs) and attributable risk percent (AR%) of AUD were higher in women than men except for the 0-17 age group. The HRs and 95% confidence intervals (CI) were 4.76 (2.34-9.67), 2.66 (2.14-3.30), 3.50 (2.50-4.90), 1.50 (0.55-4.06) in men, and 3.23 (1.35-7.69), 4.10 (2.95-5.70), 8.49 (4.08-17.69), and 17.18 (4.66-63.30) in women aged 0-17, 18-44, 45-64, and ≥65 years, respectively. The AR% was 79.0%, 62.3%, 71.5%, and 33.3% in men, and 69.5%, 75.6%, 88.2%, and 94.2% in women of ages 0-17, 18-44, 45-64, and ≥65, respectively.

Conclusions:

Low-income was found to be a risk factor for alcohol use disorders in men and women. In general, the incidence rates were higher in men compared to women.

Keywords

Substance use disorders, Alcohol, Risk factors, Health economy

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Introduction

Several studies have associated an increased risk of substance use disorders with decreased household income and personal earnings [1-6]. A higher prevalence of depression has been reported among low-income individuals [7,8]. Results from a previous study show that individuals in lower income categories are more likely to develop mental disorders compared with those in the higher income category [2]. In another study, low levels of household income have been associated with increased risk of substance use disorders (SUDs) [2]. Gender is reported to have moderated the association between negative socioeconomic changes and incident substance use [9]. It is important to state that SUDs refer to a superordinate category which is comprised of a number of singular disorders (e.g., alcohol use disorder (AUD), cannabis use disorder, etc.) [10]

AUDs constitute a major public health problem in Taiwan [11] and are one of the most widespread psychiatric disorders that is associated with a higher morbidity and mortality [12]. Socioeconomic status is one of the main factors that may greatly influence a person's alcohol use and related outcomes such as AUD [13]. Previous epidemiologic studies have not fully investigated the association between AUD and low-income especially by gender and separate age groups [9]. Therefore, the aim of this study was to investigate the association between low-income and AUDs among different gender and age groups in Taiwan.

Methods

Data were collected from the 2005 and 2010 Longitudinal Health Insurance Databases (LHID 2005 and 2010) contained in the National Health Insurance Research Database (NHIRD). Each database contains the reimbursement claim data of approximately 1,000,000 beneficiaries randomly sampled from the total population in Taiwan. The integrated medical records of the randomly sampled beneficiaries were from 2000-2011. The overall samples included 1,824,491individuals (898, 160 males and 926,331 females). Low-income individuals (specifically, Group Insurance Applicants, i.e., category "51" or "52") were identified from 2001-2003, AUD positives excluded at that time. The same individuals were reviewed from 2004-2010 to ascertain AUD positive diagnosis, and relationship to gender and socioeconomic status. Low-income was defined as having family income less than 20,000NTS (New Taiwan Dollar) per month. The reported codes for AUD included the ICD-9-CM codes 291.XX, 303. XX and 305.0X. This study was approved by the Institutional Review Board of Chung Shan Medical University Hospital.

The samples were divided into four age groups (0-17, 18-44, 45-64, and ≥65 years) based on gender. Nominal variables were analyzed using the Chi-square test. The HRs, as well as crude and adjusted attributable risks (AR) was also determined. Survival analysis was used to investigate the effects of low-income on AUDs. Adjustments were made for age, geographic location and urbanization level. The SAS statistical software (version 9.1.3. SAS Institute Inc., Cary, NC, USA) was used for statistical analyses.

Results

The demographic characteristics of the study individuals are shown in **Table 1**. In general, 25,011 individuals were from low-income households (males, 11,515 and females, 13,496). The proportion of females from low-income households was significantly higher compared to those from non-low-income households (53.96 vs. 50.73%). Age distribution was different among low-income and non-low-income individuals. The highest proportion of low-income (i.e., 41.33%) and non-low-income participants (i.e., 48.03%) was found in the 18-44 age group. Geographical distributions and urbanization levels were significantly different among the participants.

Table 2 shows the proportion of males and females with AUDs in relation to low-income and non-low-income. In general, the incidence of AUDs was higher in low-income compared to non-low-income individuals, as well as in men than women regardless of the age group and income status. In addition, AUD was more common in the 18-64 age categories of low-income individuals, that is, 2.32% in men aged 45-64 and 0.65% in women aged 18-44.

Table 3 shows the HRs, as well as crude and adjusted AR for AUD in low-income men and women. The HRs and attributable risk percent were higher in the 0-17 age category of men compared to women. However, women in the 18-64 age groups had higher values compared to their male counterparts. The HRs and 95% confidence intervals of AUDs were 4.76 (2.34-9.67), 2.66 (2.14-3.30), 3.50 (2.50-4.90), 1.50

Table 1: Demographic characteristics of low-income and non-low-income individuals (n=1,824,491).

Variables	non-low-income individuals (n=1,799,480)		low-income individuals (n=25,011)		p-value
Gender					< . 001
Male	886,645	(49.27)	11,515	(46.04)	
Female	912,835	(50.73)	13,496	(53.96)	
Age in 2001					< . 001
0-17	452,803	(25.16)	9,924	(39.68)	
18-44	864,312	(48.03)	10,337	(41.33)	
45-64	358,023	(19.90)	2,922	(11.68)	
≥65	124,342	(6.91)	1,828	(7.31)	
Geographical location (Missing=33)					< . 001
Taipei area	656,176	(36.47)	8,473	(33.88)	
North area	262,600	(14.59)	2,847	(11.38)	
Central area	330,025	(18.34)	3,546	(14.18)	
South area-1	249,950	(13.89)	3,106	(12.42)	
South area-2	263,031	(14.62)	4,961	(19.84)	
East area	37,665	(2.09)	2,078	(8.31)	
Urbanization level* (Missing=33)					< . 001
Level 1	557,212	(30.97)	5,994	(23.97)	
Level 2	555,498	(30.87)	7,087	(28.34)	
Level 3	304,982	(16.95)	3,830	(15.31)	
Level 4	234,001	(13.00)	3,748	(14.99)	
Level 5	30,103	(1.67)	761	(3.04)	
Level 6	62,244	(3.46)	1,960	(7.84)	
Level 7	55,407	(3.08)	1,631	(6.52)	
*Urbanization was divided into seven levels, that is, Level 1 (most urbanized) to Level 7 (least urbanized).					

Table 2: Proportion of low-income and non-low-income male and female patients with alcohol use disorders from 2004-2010.

		Age															
		0-17				18-44				45-64				≥65			
Gender	Alcohol use disorders	non low-income individuals		low-income individuals		non low-income individuals		low-income individuals		non low-income individuals		low-income individuals		non low-income individuals		low-income individuals	
		n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)	n	(%)
Males	No	228,656	(99.97)	4,695	(99.81)	417,662	(99.32)	3,993	(97.89)	172,760	(99.40)	1,517	(97.68)	61,627	(99.74)	1,057	(99.62)
	Yes	67	(0.03)	9	(0.19)	2,872	(0.68)	86	(2.11)	1,045	(0.60)	36	(2.32)	160	(0.26)	4	(0.38)
Females	No	224,023	(99.98)	5,212	(99.89)	441,938	(99.88)	6,125	(99.35)	183,440	(99.95)	1,319	(99.40)	62,449	(99.98)	757	(99.61)
	Yes	52	(0.02)	6	(0.11)	527	(0.12)	40	(0.65)	97	(0.05)	8	(0.60)	13	(0.02)	3	(0.39)

(0.55-4.06) in low-income men aged 0-17, 18-44, 45-64, and ≥65, respectively. Low-income women in the 0-17, 18-44, 45-64, and ≥65 age groups had HRs of 3.23 (1.35-7.69), 4.10(2.95-5.70), 8.49 (4.08-17.69), and 17.18 (4.66-63.30). The AR% of AUDs were 79.0%, 62.3%, 71.5%, and 33.3% in low-income men of ages 0-17, 18-44, 45-64, and ≥65 age groups, respectively. Similarly, low-income women in the age groups: 0-17, 18-44, 45-64, and ≥65 had AR% of 69.5%, 75.6%, 88.2%, and 94.2%, respectively.

Discussion

To our knowledge, this is the first longitudinal follow-up study that has investigated the association between low-income and AUDs in Taiwan based on gender and age groups. In general, we found that AUDs were more common in low-income compared to non-low-income individuals and also in men than women in all age groups. However, higher incidence rates were observed mainly in the 18-44 and 45-64 age categories. Compared to other age groups, men had higher HRs and AR% than women only in the 0-17 age group. These findings suggest that low-income females above the age of 18 might be more susceptible to AUDs. These findings have important public health implications.

Increased substance use has been reported among adults who were exposed to economic crises [14]. According to Dearing and colleagues,

Table 3: Hazard ratios and crude and adjusted attributable risks of alcohol use disorders in low-income men and women.

Gender				Age	
	0-17	18-44	45-64	≥65
Males				
non-low-income	-	-	-	-
low-income				
HR	4.76 (2.34-9.67)	2.66 (2.14-3.30)	3.50 (2.50-4.90)	1.50 (0.55-4.06)
Crude AR%	84.2%	67.8%	74.1%	31.6%
Adjusted AR%	79.0%	62.3%	71.5%	33.3%
Females				
non-low-income	-	-	-	-
low-income				
HR	3.23 (1.35-7.69)	4.10 (2.95-5.70)	8.49 (4.08-17.69)	17.18 (4.66-63.30)
Crude AR%	81.8%	81.5%	91.7%	94.9%
Adjusted AR%	69.5%	75.6%	88.2%	94.2%

women are more affected by changes in family income compared to men [15]. Their results align with our observations. In a cross-sectional study, low levels of household income have been associated with several lifetime mental disorders while a reduction in household income has been associated with increased risk of incident mental disorders. However, AUDs was not assessed based on gender and age groups. In another study analysing separate age groups (18-29, 30-49, 50-64 years), a 3-year total incidence rate of any substance use was higher in men than women (5.7% *vs* 1.8%). Men showed about three times more risk of SUDs (p<0.001) [9]. In this study, we analysed the incidence rate of specific SUD (that is, AUDs) based on age, gender and income status. This serves as one of the strengths of our study. Another study has estimated sex and age-specific incidence rates as well as the cumulative incidence of mental and behavioural disorders due to psychoactive substance abuse [16]. However, the relationship between low-income and AUDs were not clearly defined across different gender and different age groups [2,9,16]. Some of our study limitations are worth noting. First, we did not have data on the severity of AUD. In addition, the association between AUD and low-income may have been confounded by socioeconomic factors, comorbidity, and family issues.

Conclusion

In conclusion, we found that low-income was a risk factor for AUDs in both men and women. We also found that the incidence rate was higher in men than women. Compared to other age groups, women aged 18-64 had higher HRs and AR% than their male counterparts. Based on these findings, optimal intervention strategies in relation to AUDs are essential.

Acknowledgements

Conflict of interest

Authors declare that they have no competing interests.

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