Original article

Association of an adult obesity, blood pressure adulthood socio-economic position

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Background: The purpose of this study is to investigate an effect of childhood and adulthood socio-economic position on selected cardiovascular risk factors including obesity, blood pressure level and smoking behavior. **Materials and Methods:** This is a cross-sectional study performed on 479 individuals, randomly selected by random clustered sampling from men and women aged 30-50 years, living in Esfahan. Their demographic characteristics, education, occupation and smoking behavior were questioned. Their weight, height and blood pressure were also measured, and their BMI (Body Mass Index) was calculated. The data were analyzed by SPSS 19 software. **Results:** In men, the odds ratio for ever smoking to never smoking at higher levels of education in comparison with the lower levels was 6.08 (2.65-14.11). For manual occupation to non-manual occupation, it was 3.55 (1.88-6.68). The odds ratio for obesity and overweight vs no overweight, for manual occupation to non-manual occupation was 3.12 (1.81-5.40) in men and for father's occupation it was 2.03 (1.10-3.74). In women, their education with the odds ratio of 2.11 (1.17-3.82) and father's occupation with the odds ratio of 6.63 (3.50-12.58) altered their chance of being obese or overweight. Also, in women, the mean systolic blood pressure was significantly lower at higher educational levels and in those whose fathers' occupation were manual but lower in manual workers. **Conclusion:** The current socio-economic position in individuals is associated with an obesity and smoking behavior, particularly in men. Childhood socio-economic position increases the chance of an obesity and higher blood pressure, particularly in women.

Key words: Blood pressure, obesity, risk factors, socio-economic status, smoking

INTRODUCTION

An effect of socio-economic position on health, quality of life, mortality and morbidity and disease risk factors is well established.[1] Socio-economic to inequalities in risk factors. Obesity, hypertension and smoking are cardiovascular risk factors that are associated with the socio-economic status. A study performed in the United States showed that, higher levels of education and occupation are related to the lower levels of blood pressure and reduced smoking.[6]

Eastern Europe revealed that, individuals with manual occupation were more prone to obesity, high blood pressure and smoking and education had an inverse relation with cardiovascular risk factors.[7]

Also, recent studies suggest that, childhood socio-economic position influences an adult morbidity and mortality.[8] In fact, several adult cardiovascular risk factors, such as the cholesterol level, hypertension, smoking and obesity probably commence at earlier [9]

European countries, an effect of child's socio-economic status on obesity and smoking was demonstrated.[1] In another study it was concluded that, childhood socio-economic position affected the weight gain in women.[10]

However, limited studies have investigated the link between the childhood positions and adult behaviors factors.[10]

Our aim is to examine the contribution of childhood and adulthood socio-economic position on cardiovascular risk factors and to evaluate whether childhood circumstances influence these risk factors through their association with adult position or independently.

MATERIALS AND METHODS

This is a cross-sectional study conducted in Esfahan. The study was performed in 2011. The sample consisted of 479 individuals, selected by random cluster sampling. Inclusion criteria consisted of men

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and women aged 30-50 years. Each participant signed an informed consent.

Exclusion criteria included those who didn't want to participate in the study. Data were gathered by interview and physical exam using a checklist. The data gathered consisted of age, sex, marital status, occupation, spouse's occupation, education, father's occupation in childhood and the smoking status. Ethical considerations were approved by Research Council of Esfahan Medical School.

After an interview, the weight of each individual was measured by a standard scale without shoes and with minimum clothing. The height was measured by a tape meter using the standard protocol. Body Mass Index (BMI) was calculated as weight/height*height. Individuals were categorized according to their BMI to normal weight (BMI ≤ 25), overweight (25 < BMI ≤ 30), and obese (BMI > 30).

The blood pressure of the individuals was measured 2 times with a 5-minute interval in a sitting position and from their right hand. The mean blood pressure was calculated and considered as a continuous variable.

Smokers were considered as those who smoked one or more cigarettes per day, and individuals were divided into 3 groups according to their smoking behavior: current smokers, past smokers and non-smokers.

Father's occupation was considered as an indicator of childhood socio-economic position. Each individual's occupation and education were considered as an indicator of adulthood socio-economic position. Father's occupation in childhood and men's occupation status were categorized into manual and non-manual. In women, occupation was categorized into manual, non-manual and housekeeping. The work, which was based on using the hands such as in mechanics, bakers, gardeners, shopmen etc. was considered manual, and the kind of work done by the people who had gained qualifications from college, such as architects, lawyers, teachers, doctors and etc., was considered non-manual.

An education level of the studied population was divided into 4 groups: Under 12 years of education, 12 years of education, 13-15 years of education, and over 16 years of education.

The data were presented as mean ±SD and frequencies. Continuous dependent variables were compared among socio-economic groups using the ANOVA and independent T-test. Categorical dependent variables were compared among socio-economic groups using the Chi - square test. Logistic regression was used for studying the association of dependent and independent variables.

RESULTS

The demographic and socio-economic characteristics of the studied population are demonstrated in Table 1. There were 479 individuals including 235 men with the mean age of 40.29 years, and 244 women with the mean age of 40.39 years, participating in the study. 86.4% of the men and 90.2% of the women were married. Manual and non-manual occupations in men were 61.7% and 38.3%, respectively. In women, 5.7% had manual and 18.9% had non-manual occupations, and 75.4% were housekeepers. Current smoking was 23.4% in men and 1.2% in women (P = 0.000). In men, BMI and mean systolic blood pressure were significantly higher than in women (P = 0.035).

Table 1: Characteristics of study population

	Male (N = 235) (%)	Female (N = 244) (%)	P value
Age*	40.29 (7.53)	40.39 (7.45)	0.889
Occupation			
Manual	145 (61.7)	14 (5.7)	0.000
Non manual	90 (38.3)	46 (18.9)	
House keeper	0	184 (75.4)	
Spouse occupation			
Manual	3 (1.5)	125 (56.6)	0.000
Non-manual	33 (16.3)	96 (43.4)	
House keeper	167 (82.3)	0	
Father occupation			
Manual	180 (76.6)	185 (75.8)	0.463
Non-manual	55 (23.4)	59 (24.2)	
Education			
Under 12 y	85 (36.2)	109 (44.7)	0.196
12 y	85 (36.2)	72 (29.5)	
13 to 15 y	18 (7.7)	22 (9.0)	
16 y and over	47 (20.0)	41 (16.7)	
Spouse education			
Under 12 y	68 (33.3)	88 (37.8)	0.681
12 y	78 (38.2)	85 (36.5)	
13 to 15 y	19(9.3)	16 (6.9)	
16 y and over	39 (19.1)	44 (18.9)	
Smoking			
Current smoker	55 (23.4)	3 (1.2)	0.000
Past smoker	24 (10.2)	1 (0.4)	
Non smoker	156 (66.4)	240 (98.4)	
BMI category			
No over weight	101 (43.0)	81 (33.2)	0.060
Over weight	92 (39.1)	104 (42.6)	
Obesity	42 (17.9)	59 (24.2)	
BMI calculation*	26.12(4.01)	26.98 (4.37)	0.026
Mean systolic blood pressure*	131.0 (16.99)	127.7 (16.74)	0.035
Mean diastolic blood pressure*	81.47 (11.56)	80.93 (10.78)	0.602

*Mean and standard deviation are presented for continuous variables, number and proportion are presented for categorical variables

According to the studied variables, the mean systolic and diastolic blood pressure levels are presented in Table 2. The mean systolic blood pressure of women differed significantly according to their occupation (P = 0.024). However, this difference was not significant in men. Also, systolic and diastolic blood pressure was significantly higher in women, whose father's occupation was manual in comparison with the other group. The systolic blood pressure at lower educational levels was significantly higher than those with higher educational levels (P = 0.005). Also, the mean blood pressure in non-married women had the lowest level.

Table 3 depicts the prevalence of overweight and obesity according to different variables. Overweight and obesity differed according to the marital status in women. In men, overweight and obesity were significantly associated with their occupation (manual and non-manual) and inwomen, they were associated with their spouse's and father's occupation. Also, in women, the prevalence of overweight and obesity were higher in the lower socio-economic status.

Table 4 demonstrates the smoking behavior in men and women according to different variables. There was no difference in smoking prevalence due to marital status. Smoking prevalence was higher in manual workers in both, men and women (P < 0.05). Smoking behavior was not associated with marital status, spouse's occupation, father's occupation and spouse's education in both, men and women. Smoking was lower in men with more than 16 years of education.

Table 5 demonstrates the odds ratio for smoking and BMI by childhood and adulthood socio-economic status.

Table 2: Mean systolic and diastolic blood pressure in different variables

	Male		Female	
	Mean systolic Blood pressure	Mean diastolic Blood pressure	Mean systolic Blood pressure	Mean diastolic Blood pressure
Occupation				
Manual	131.0 (17.28)	81.64 (11.64)	118.89 (11.68)	76.75 (9.10)
Non-manual	131.0 (16.61)	81.18 (11.49)	124.36 (20.15)	79.31 (13.19)
House keeper			129.32 (15.86)	81.66 (10.16)
P value	0.967	0.765	0.024	0.137
Spouse Occupation				
Manual	124.33 (4.75)	76.00 (2.00)	128.98 (16.26)	81.92 (10.82)
Non-manual	133.07 (20.89)	81.01 (11.53)	126.45 (17.02)	80.26 (10.46)
House Keeper	131.54 (16.74)	82.12 (11.93)		
P value	0.685	0.610	0.266	0.252
Father Occupation				
Manual	131.5 (17.28)	81.58 (11.58)	129.1 (16.74)	81.82 (10.45)
Non-manual	129.5 (16.07)	81.10 (11.59)	123.5 (16.17)	78.16 (11.43)
P value	0.448	0.792	0.024	0.031
Education				
Under 12 y	129.51 (18.55)	79.71 (11.71)	131.44 (16.78)	82.01 (10.75)
12 y	129.73 (15.73)	81.67 (11.63)	126.84 (16.38)	81.93 (10.22)
13 to 15 y	139.25 (18.42)	86.05 (13.90)	125.70 (16.13)	77.88 (10.22)
16 y and over	133.12 (14.98)	82.53 (9.78)	120.81 (15.48)	77.95 (11.61)
P value	0.106	0.156	0.005	0.085
Spouse Education				
Under 12 y	131.61 (18.61)	80.55 (12.90)	132.39 (16.83)	82.18 (11.06)
12 y	131.50 (16.82)	83.19 (12.06)	124.67 (14.04)	80.26 (9.75)
13 to 15 y	137.31 (20.06)	83.36 (10.61)	134.93 (20.11)	83.43 (12.31)
16 y and over	128.92 (14.51)	80.35 (9.54)	125.03 (18.28)	80.47 (11.40)
P value	0.396	0.430	0.003	0.521
Marital Status				
Not Married	127.62 (14.11)	79.37 (9.81)	116.81 (10.75)	74.04 (9.89)
Married	131.68 (17.34)	81.85 (11.78)	127.88 (16.64)	81.22 (10.69)
Divorced	111.50	68.5	135.50 (18.75)	81.92 (11.85)
P value	0.240	0.287	0.023	0.093

Table 3: Prevalence of obesity and overweight by different variables

	Male			Female		
	No over weight (%)	Over weight (%)	Obesity (%)	No over weight (%)	Over weight (%)	Obesity (%)
Marital Status						
Not married	18 (58.1)	10 (32.3)	3 (9.7)	8 (78.7)	2 (18.2)	1 (9.1)
Married	83 (40.9)	81 (39.9)	39 (19.2)	72 (32.7)	95 (43.2)	53 (24.1)
Divorced	0	1 (100)	0	1 (7.9)*	7 (53.8)	5 (38.5)
P value		0.270			0.019	
Occupation						
Manual	47 (37.4)	64 (44.1)	34 (23.4)	5 (35.7)	7 (50)	2 (14.3)
House keeper		55 (29.9)	81 (44)	48 (26.1)		
P value		0.000			0.292	
Spouse Occupation						
Manual	3 (100)	0	0	30 (24)	63 (50.4)	32 (23.6)
Non-manual	17 (51.5)	11 (33.3)	5 (15.7)	42 (43.8)	32 (33.3)	22 (22.9)
House keeper	63 (37.7)	70 (41.9)	34 (20.4)			
P value		0.160			0.006	
Father Occupation						
Manual	70 (38.9)	34 (40.6)	37(20.6)	42 (22.7)	89 (48.1)	54 (22.2)
Non-manual	31 (56.4)	19 (34.5)	5(9.1)	39 (66.1)	15 (25.4)	5 (8.5)
P value		0.039			0.000	
Education						
Under 12 y	37 (43.5)	28 (32.9)	20 (23.5)	27 (24.8)	51 (46.8)	31(28.4)
12 y	38 (44.7)	35 (41.2)	12 (14.1)	25 (34.7)	26 (36.1)	21 (29.2)
13 to 15 y	7 (38.9)	8 (44.4)	3 (16.7)	7 (31.8)	12 (54.5)	3 (13.6)
16 y and over	19 (40.4)	21 (44.7)	7 (14.9)	22 (53.7)	15 (36.6)	4 (9.8)
P value		0.667			0.014	
Spouse Education						
Under 12 y	22 (32.4)	32 (47.1)	14 (20.6)	21 (23.9)	41 (46.6)	26 (29.5)
12 y	35 (44.9)	27 (34.6)	16 (20.5)	27 (31.8)	37 (43.5)	21 (24.7)
13 to 15 y	7 (36.8)	7 (36.8)	5 (10.3)	6 (37.5)	6 (37.5)	4 (25)
16 y and over	19 (48.7)	16 (41.0)	4 (10.3)	19 (43.2)	17 (38.6)	8 (18.2)
P value		0.432			0.443	

The odds ratio for ever-smoking to never smoking in men, at higher levels of education (>12 years) in comparison with lower levels (≤12 years) was 6.08 (2.65-14.11). For manual occupation to non-manual occupation, it was 3.55 (1.88 - 6.68). This effect was seen even after combining these 2 factors in model 2 of logistic regression. In men, father's occupation didn't have any effect on their smoking behavior. Socio-economic position (occupation and education) didn't have any influential effect on smoking behavior in women. The odds ratio for obesity and overweight vs. no overweight, in men, for manual occupation to non-manual occupation was 3.12 (1.81-5.40) and for father's occupation, it was 2.03 (1.10-3.74). In men, in model 3 of logistic regression when education, occupation and father's occupation are adjusted for each other, only occupation continued its effect on obesity and overweight. In women, their education with the odds ratio of 2.11 (1.17-3.82) and father's occupation with the odds ratio of 6.63 (3.50-12.58) altered their chance of being obese or overweight, but after adjustment in model 3, only father's occupation continued its effect.

DISCUSSION

This study shows that non-manual occupation in men is associated with lower levels of obesity and overweight and decreased prevalence of smoking behavior. Also, higher educational levels influence smoking in males. Socio-economic positions (occupation and education) do not have any influential effect on smoking behavior in women, but this may be related to few female smokers (1.2%) in our study.

According to this research, higher educational levels in women are related to lower prevalence of overweight,

Table 4: Prevalence of smoking behavior by different variables

	Male			Female		
	Current smoker (%)	Past smoker (%)	Non smoker (%)	Current smoker (%)	Past smoker (%)	Non smoker (%)
Marital status						
Not married	11 (35.5)	0	20 (64.5)	0	0	11 (100)
Married	44 (21.7)	24 (11.8)	135(66.5)	2 (0.9)	1 (0.5)	217 (98.6)
Divorced	0	0	1 (100)	1 (7.7)	0	12 (92.3)
P value		0.171			0.298	
Occupation						
Manual	46 (31.7)	17 (11.7)	82 (56.6)	1 (7.1)	0	13 (92.9)
Non-manual	9 (10)	7 (7.8)	74 (82.2)	2 (4.3)	0	44 (95.7)
House keeper				0	1 (0.5)	183 (99.5)
P value		0.000			0.036	
Spouse occupation						
Manual	0	1 (33.3)	2 (66.7)	1 (0.8)	0	124 (99.2)
Non-manual	6 (18.2)	2 (6.1)	25 (75.8)	1 (1)	0	94 (97.9)
House keeper	38 (22.8)	21 (12.6)	108(64.7)			
P value		0.460			0.510	
Father occupation						
Manual	45 (25)	21 (11.7)	114 (63.3)	3 (1.8)	1 (0.5)	181 (97.8)
Non-manual	10 (18.2)	3 (5.5)	49 (76.4)	0	0	59 (100)
P value		0.173			0.523	
Education						
Under 12 y	32 (37.6)	12 (14.1)	41 (48.2)	0	1 (0.9)	108 (99.1)
12 y	17 (20)	11 (12.9)	57 (67.1)	0	0	72 (100)
13 to 15 y	2 (11.1)	0	16 (36.5)	1 (4.5)	0	21 (95.5)
16 y	4 (8.5)*	1 (2.1)	42 (89.4)	2 (4.9)	0	39 (95.1)
P value		0.000			0.126	
Spouse education						
Under 12 y	18 (26.5)	9 (13.9)	41 (60.3)	1 (1.1)	1 (1.1)	86 (97.7)
12 y	17 (21.8)	10 (12.8)	51 (64.5)	1 (1.2)	0	84 (98.8)
13 to 15 y	4 (21.1)	1 (5.3)	14 (73.3)	0	0	16 (100)
16 y	5 (12.8)	4 (10.3)	30 (76.9)	1 (2.3)	0	43 (97.7)
P value		0.637			0.898	

^: Never smoker, No overweight, Non-manual occupation and under 12 years education are referenced, Model (1): Occupation or father occupation or education separately, Model (2): Occupation and education are adjusted for each other, Model (3): Occupation, education and father occupation are adjusted for each other, **: *P* value < 0.001, *: *P* value < 0.05

manual occupation (as an indicator of childhood socio-economic position) is related to lower blood pressure in females. Spouse's non-manual occupation in women causes lower prevalence of obesity.

In line with the previous researches, this study reveals that education and occupation, as indicators of current socio-economic position, are associated with the prevalence of cardiovascular risk factors in adults. These two have a more influential effect on men, although educational level also affects women.

A study conducted by Winkelby and his colleagues showed that, occupation and education were factors that were related to smoking behavior in men.[6] This may be associated with material deprivation and a way to cope with adverse circumstances.[2] In a study derived from Isfahan healthy heart program, it was concluded that in the lower in middle educational group.[11] In women, educational levels had a more influential effect on blood pressure, but this effect was not significant on men's blood pressure level.[6] A study performed in 2005 in several European countries demonstrated that, higher educational levels in men caused lower BMI and lower cigarette smoking.[1] Other studies also found the protective effect of an education and occupation on cardiovascular risk factors, particularly in men.[7,10,12]

According to the present study, childhood socio-economic position affects adulthood cardiovascular risk factors, such as obesity and higher levels of blood pressure, and its influence is higher in females, but it doesn't have any association with their smoking behavior. In a study conducted in 2005, Power *et al*. revealed that women with lower levels of socio-economic position in earlier stages of life were probably more obese but this association was weaker in men.[1] Also, other studies showed that weight

Table 5: Odds ratio (95%CI) for smoking and BMI by childhood and adulthood socio-economic status

Variables ^	Model (1)	Model (2)	Model (3)
Smoking (Ever smokers Vs Never smokers)			
Male			
Occupation	3.55 (1.88 - 6.68)**	2.61 (1.35-5.07)*	2.56 (1.29 -5.07)*
Father Occupation	1.87 (0.93 - 3.73)		1.09 (0.50 – 2.36)
Education	6.08 (2.65 -14.11)**	4.68 (1.97-11.09)**	4.61 (1.93-11.02)**
BMI (Obesity and Over weight Vs No overweight)			
Male			
Occupation	3.12 (1.81-5.40)**	3.90 (2.14-7.13)**	3.58 (1.94-6.65)**
Father Occupation	2.03 (1.10-3.74)*		1.73 (0.89 – 3.39)
Education	0.84 (0.47 - 1.51)	0.50 (0.259-1.09)	0.46 (0.24 to 1.30)
Female			
Occupation			
Manual	1.51 (0.43-5.21)	1.10 (0.30-4.05)	1.08 (0.27 to 4.29)
House keeper	1.97 (1.01-3.81)	1.38 (0.63-3.02)	1.78 (0.76 to 4.18)
Father Occupation	6.63 (3.50-12.58)**		6.55 (3.44-12.83)**
Education	2.11 (1.17-3.82)*	1.82 (0.90-3.66)	1.02 (0.46 to 2.24)

^: Never smoker, No overweight, Non-manual occupation and under 12 years education are referenced, Model (1): Occupation or father occupation or education separately, Model (2): Occupation and education are adjusted for each other, Model (3): Occupation, education and father occupation are adjusted for each other, **: *P* value < 0.001, *: *P* value < 0.05

gain in women was related to their childhood socio-economic position and education levels, and in men, to their education and income levels.[10] In another study performed in 2008 and 2009, an effect of childhood socio-economic position on later obesity was stronger in women, but in men, adulthood conditions were more effective.[13,14] In line with this research and according to the previous studies, an education can be mentioned as a factor that mediates the effects of childhood socio-economic position and cardiovascular disease risk factors.[15,16] However, education achievements are usually a result of childhood circumstances and family background.[17]

The limitation of our study was that we didn't include other indicators of the socio-economic position, such as income for adulthood circumstances and parent's education and income for childhood background, but occupation and particularly education are measures that can reveal the socio-economic position properly.[6]

Therefore, current and childhood socio-economic position of the individuals has an important influence on their obesity, blood pressure and smoking behavior. This could be related to lifestyle factors, such as nutrition and leisure time, physical activities and different life conditions. Effective interventions should thus be targeted to reduce these inequalities.

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