Association of socioeconomic classes with diet, stress and hypertension

Hafiz Muhammad Aslam,[1] Arsalan Ahmad Alvi,[2] Anum Mughal,[3] Zara Haq,[4] Wardah Asif Qureshi,[5] Abdul Haseeb,[6] Sina Aziz[7]

Abstract

Objective: To evaluate the relationship between diet and socioeconomic conditions and find out the prevalence of stress and Hypertension in different socioeconomic classes.

Methods: A cross-sectional study was conducted from May 2010 to October 2011, 176 people from four different socio economic Strata (low class, low middle class, upper middle class, and high class) were selected, which were defined on the basis of monthly income. Complete dietary intake was assessed with the last 3 days' dietary record, dietary patterns and restrictions. Background information and Stress level were evaluated by a preformed questionnaire and blood pressure was taken with the aneroid manometer.

Result: A total of 176 people were interviewed for diet, blood pressure and stress was measured.

The High socioeconomic Stratum was found to have the highest number of people having hypertension 15 (27.8%), taking medications 21 (38.9%), 18 (33.3%) multi vitamin supplements, and with an overall lower calorie intake 1617.31±698.99 as compared to other strata. It also had the highest number of people who thought they were active 44 (81.5%).

The High middle Socioeconomic Stratum was similar with the High class, in having the most hypertensive people 10 (27.8%) and they had least chance of developing stress related health illnesses 6 (16.7%).

Individuals living below poverty line had the highest prevalence ratio of stress 16 (36.4%) and they were considered as least physically active 30 (68.2%).

Conclusion: Highest frequency of Hypertension was in high class and high middle income group. The low class had the highest ratio of stress. There was a difference in type of food, but not much in calorie intake.

Keywords: Stress, Hypertension, Diet. (JPMA 63: 289; 2013)

Introduction

Socioeconomic status is an individual or group's position within a hierarchical social structure. Socioeconomic status depends upon a combination of variables including occupation, education, income, wealth and place of residence. Sociologists often use socioeconomic status as a mean of predicting behaviour and also socioeconomic differences play an important role in dietary habits of the individual.[1-3] The link between low economic status and unhealthy or essentially lacking diet is well established. These groups of people tend to skip breakfast[2] and have a higher frequency of obesity.[2-4] It's been known for a long time, that certain diseases are more frequent in lower socioeconomic classes.[1,4] Knowledge about the nature of this association, its main risk factors and how to improve health outcomes in lower social groups is still limited.

People belonging to different backgrounds have different prevalence rate of diseases like hypertension.[4] Several European Studies show a higher prevalence of cardiovascular diseases and cardiovascular risk factors including smoking, obesity, physical inactivity, hypertension and hypercholesterolemia in lower socioeconomic classes.[1,4] Behavioural factors such as smoking, obesity and physical inactivity are more commonly present in the lower socioeconomic groups.[4]

In many studies it has been seen that the lower socioeconomic stratum comprised a higher proportion of individuals having hypertension.[4,5] It has been known that in the Asian continent one of the major causes of suicide is acute stress due to financial problems.[6] These are the most common diseases worldwide and the socioeconomic inequality can be blamed for causing unhealthy lifestyles and stress.[7]

Our research study investigated the dietary habits, prevalence of hypertension and stress among different socioeconomic strata.

Patients and Methods

Cross sectional study, conducted in duration of 18 months in Karachi from May 2010 to October 2011. Inquiries were made based upon a self-structured questionnaire, which

[1-6]4th Year Student, [7]Department of Pediatrics Unit-I, Dow Medical College (DUHS), Karachi. (Presently working at Abbasi Shaheed Hospital, KMDC, Karachi).

Correspondence: Hafiz Muhammad Aslam. Email: coolaslam8@hotmail.com

was developed according to the need of the study, and proper interview of participants. Ethical issues were confirmed by Ethical Review Board of Dow University of Health Sciences. This study was done on general population and 176 participants were interviewed. Sample size was calculated using Open-epi sample size calculator p=26% d=7% and 95% C.I. Participants were divided on the basis of their monthly income into four socioeconomic classes, High class, high middle class, and low middle class and below poverty line group. The stratification was based on the criteria provided by the World Bank.[8] To make it simple the U.S Dollar was converted into Pakistani rupees and at that time 1 U.S dollar was equivalent to 83.4 Pakistani rupees and the result was rounded to nearest hundred. Two Blood Pressure readings were taken with an interval of 10 minutes and their average was calculated to check if the person was hypertensive.[9] Stress questionnaire was taken from International Stress management association UK and stress results were analyzed by the key provided with questionnaire.[10] A complete 3 days dietary record was taken and Diet analysis was done on the basis of food chart of United States Department of Agriculture and one cup of coffee and tea was considered to be equivalent to 236.5 ml.

People falling into age group of 20-60 years were included in this study.

All the data was entered and then analyzed through SPSS 19. Kruskal Wallis H test was used for the evaluation of difference of calories and amount of protein, carbohydrate and fats in diet. For the association between blood pressure, medication, vitamin, marital status and physical activity Chi- square test was used if 0 cells showed expected count less than 5. Else, rest of associations were found out using Spearman correlation.. The threshold for statistical significance was set at $P < 0.05$. The percentages in each column add up to 100%.

Results

Total number of participants were 176 and response rate was 100%.Participants were between ages of 20-60 with a mean age of 38.51± 11.06 years. Out of 176, 143 were married and 32 unmarried (p <0.032).44 participants belonged to below poverty group, 42 belonged to low middle income class, 36 belonged to high middle income class and 54 belonged to high class (Table-1) .

Out of fifty four (54) participants of high class, 9 (16%) had high, 40 (74.1%) had moderate and 5 (9.3%) had low risk of developing stress (p <0.010). On examination 15 (27.8%) people were found to be hypertensive (p <0.642). On average, people of high class took 1617.31±698.991 kilocalories per day. Diet of this class included average protein (60.66±30.194g), average carbohydrate (220.51±130.588g) and average fat (63.52±26.36g.) (Table-1).This stratum contained the highest percentage of population taking medications 21 (38.9%) (p <0.003) and multi vitamins supplements 18 (33.3%) (p <0.003).In terms of body shape 25 (46.3%) had apple shape and 9

Table-1: Values of stress, Blood pressure and diet findings.

Clinical findings	High class n=54 (%)	High middle income group n=36 (%)	Low middle income group n=42 (%)	Below poverty group n=44 (%)	P-value
*Stress Findings					
Highly prone to stress	9(16.7%)	3(8.3%)	8(19.0%)	16(36.4%)	0.010
Moderately prone to stress	40(74.1%)	27(75.0%)	32(76.2%)	26(59.1%)	0.010
Least risk of adopting stress	5(9.3%)	6(16.7%)	2(4.8%)	2(4.5%)	0.010
Blood Pressure Findings					
¥Hypertensive	15(27.8%)	10(27.8%)	9(21.4%)	8(18.2%)	0.642
Normal	39(72.2%)	26(72.2%)	33(78.6%)	36(81.8%)	0.642
****Diet Findings**					
Mean calories/day(kilocalories)	1617.31±698.99	1920.36±718.56	2073.50±1023.50	1849.54±649.89	0.018
Mean protiens/day (g)	60.66±30.19	54.15±18.97	64.75±44.37	55.84±26.80	0.759
Mean carbohydrate/day(g)	220.51±130.58	216.97±133.15	249.40±190.94	258.41±107.662	0.048
Mean Fats/day (g)	63.52±26.36	92.16±42.13	86.56±31.00	64.42±30.13	>0.001

1. Two Blood Pressure reading was taken in a span of 10 minutes and their average was calculated.
2. 3-day dietary record and its average were taken.
3. <0.05 p value was taken significant.
4. Assuming stress, blood pressure and dietary measurements to be 100% per column.
5. Highest values were indicated with bold letters

¥ Indicates Spearman test

* Indicates Pearson test

** Indicates Kruskal Wallis H test.

Table-2: Table represents the value of marital status, taking medication and vitamins, body shape, physical activity and meal.

	High class n=54 (%)	High middle class n=36 (%)	Low middle class n=42 (%)	Below poverty class n=44 (%)	P-value
¥Married	50 (92.6)	26 (72.2)	31 (73.8)	36(79..5)	0.049
¥Unmarried	4 (7.4)	10 (28.6)	10(23.8)	8(18.2)	0.049
¥Medications	21 (38.9)	8 (22.2)	3 (7.1)	9 (20.5)	0.003
¥Vitamins supplements	18 (33.3)	8 (22.2)	6 (14.6)	2 (4.5)	0.003
***Body Shape**					
Pear shape body	9 (16.7)	3 (8.3)	4 (9.5)	2 (4.5)	0.001
Apple shape body	25 (46.3)	6 (16.7)	16 (38.1)	7 (15.9)	0.001
Proportionate body	20 (37.0)	27 (75.0)	22 (52.4)	35 (79.5)	0.001
Activity and Sleep					
¥Physically active	44 (81.5)	29 (80.6)	34 (81)	30 (68.2)	0.364
*More than 10 hours	-	1 (2.8)	2 (4.8)	2 (4.5)	0.106
*8-10 hours	1 (1.9)	4 (11.1)	3 (7.1)	9 (20.5)	0.106
*7-8 hours	16 (29.6)	14 (38.9)	9 (21.4)	8 (18.2)	0.106
*6-7 hours	26 (48.1)	15 (41.7)	26 (61.9)	18 (40.9)	0.106
*Less than 5 hours	10 (18.5)	2 (5.6)	2 (4.8)	6 (13.6)	0.106
*Not sure, do not sleep well throughout night	1 (1.9)	-	-	1 (2.3)	0.106
***Meal**					
Breakfast regularly	47 (87.0)	31 (86.1)	35(83.3)	36 (81.8)	0.441
1 meal/day	1 (1.9)	1 (2.8)	1 (2.4)	1 (2.3)	0.260
2 meal/day	9 (16.7)	3 (8.3)	8 (19.0)	12 (27.3)	0.260
3 meal/day	40 (74.1)	30 (83.3)	26 (61.9)	29 (65.9)	0.260
4 meal/day	4 (7.4)	1 (2.8)	7 (16.7)	2 (4.5)	0.260
5 meal/day	-	1 (2.8)	-	-	0.260
Usage of artificial sweetener	9 (16.7)	4 (11.1)	1 (2.4)	-	0.001

1. Assuming body shape, activity sleep and meals to be 100% per column
2. Highest values were indicated with bold letters
3. <0.05 p value was taken significant
¥: Indicates Spearman test
* Indicates Pearson test.

(16.7%) had pear shaped body (p <0.001), while 44 (81.5%) people of this class considered themselves as physically active (p <0.364). In this class, 26 (48.1%) people slept for 6-7 hours (p <0.106), 47 (87%) took breakfast regularly (p <0.441), 40 (74.1%) took 3meals/day (p <0.260) and 9 (16.7%) used artificial sweetener (p <0.001) (Table-2).In this class 28 (51.9%) consumed 1 or few cups of coffee/day (p <0.003), 21 (38.9%) took 2-3 cups of tea/day (p <0.678), 35 (64.8%) took 1 or few soda drinks/day (p <0.279), 38 (70.4%) took 1 or few fruit juices/day (p <0.049), 30 (55.6%) used 1 or less fruits/week (p <0.002), 23 (42.6%) used 1 or less vegetables/week (p <0.031) and 44 (74.1%) had 1-3 meals at restaurant/week (Table-3).

Out of thirty six participants of High middle income group, 3 (8.3%) had high, 27 (75%) had moderate and 6 (16.7%) had low risk of developing stress (p <0.010). On examination 10 (27.8%) people were found to be hypertensive (p <0.642). On average, people of high middle income class took 1920±718.564 kilocalories. Diet of this class included average protein (54.15±18.97g), average carbohydrate (216.97±133.15g) and average fats (92.16±42.13g.) (Table-1) In this stratum, 8 (22.2%) people were found to be taking medication and multivitamin supplements (p <0.003). In terms of body shape 27 (75%) Participants had proportionate body (p <0.001) and 29 (80.6%) people of this class considered they as physically active (p <0.364). In this class 15 (41.7%) slept for 6-7 hours (p <0.106), 47 (86.1%) took breakfast daily (p <0.441) and 30 (83.3%) took 3 meals/day (p <0.260).(Table-2) In this class 24 (66.7%) took 1 or few cups of coffee/day (p <0.003), 15 (41.7%) took 2-3 cups of tea/day (p <0.678), 29 (80.6%) consumed 1 or few glass of soda drink/day (p <0.279) and 25 (72.6%) consumed 1 or few glass of fruit juice/day (p <0.049). Fruits 1 or less/week were used by 22 (61.1%) (p <0.002), 2 to 4 vegetables were used by 13 (36.1%) people (p <0.031) and 28 (77.8%) had 1-3 meals at a restaurant/week (Table-3).

Out of 42 participants of Low middle income group, 8 (19%) had high, 32 (76%) had moderate and 2 (4.8%)

Table-3: Table representing the values of coffee, tea , soda drink, fruit, vegetable and fruit juices intake and meal at restaurant.

	High class n=54 (%)	High middle class n=36 (%)	Low middle class n=42 (%)	Below poverty class n=44 (%)	P-value
***COFFEE cups/day**					
4-6	2 (3.7)	1 (2.8)	1 (2.4)	-	0.003
3-4	1 (1.9)	1 (2.8)	-	-	0.003
2-3	5 (9.3)	2 (5.6)	5 (11.9)	1 (2.3)	0.003
1 or few	28 (51.9)	24 (66.7)	22 (52.4)	16 (36.4)	0.003
No	18 (33.3)	8 (22.2)	14 (33.3)	27 (61.4)	0.003
***TEA cups/day**					
4-6	9 (14.8)	3 (8.3)	8 (19.0)	7 (15..9)	0.678
3-4	11 (20.4)	6 (13..9)	6 (14..3)	5 (11.4)	0.678
2-3	21 (38.9)	15 (41.7)	17 (40.5)	21 (47.7)	0.678
1 or few	11 (20.4)	10 (27.8)	9 (21.4)	8 (18.2)	0.678
No	2 (3.7)	2 (5.6)	2 (4.8)	3 (6.8)	0.678
***SODA drinks/day**					
2-3	3 (5.6)	2 (5.6)	6 (14.3)	3 (6.8)	0.279
1 or few	35 (64.8)	29 (80.6)	27 (64.3)	21 (47.7)	0.279
No	16 (29.6)	5 (13.9)	9 (21.4)	20 (45.5)	0.279
***FRUITS/week**					
More than 7	2 (3.7)	2 (5.6)	2 (4.8)	3 (6.8)	0.002
2-4	19 (35.2)	12 (33.3)	10 (23.8)	3 (6.8)	0.002
1 or less	30 (55.6)	22 (61.1)	27 (64.3)	29 (65.9)	0.002
No	3 (5.6)	-	3 (7.1)	9 (20.5)	0.002
***VEGETABLES/week**					
More than 7	7 (13.0)	7 (19.4)	12 (28.6)	13 (29.5)	0.031
4-7	5 (9.3)	4 (11.1)	6 (14.3)	6 (13.6)	0.031
2-4	18 (33.3)	13 (36.1)	12 (28.6)	12 (27.3)	0.031
1 or less	23 (42.6)	11 (30.6)	11 (26.2)	9 (20.5)	0.031
No	1 (1.9)	1 (2.8)	1 (2.4)	4 (9.1)	0.031
***MEALS AT RESTURANT/week**					
More than 3	5 (9.3)	1 (2.8)	5 (11..9)	2 (4.5)	< 0.001
1-3	44 (74.1)	28 (77.8)	23 (50)	21 (47.7)	< 0.001
1 or few	2 (7.4)	5 (13.9)	8 (23.8)	-	<0.001
No	3 (5.6)	2 (5.6)	6 (14.3)	21 (47.7)	<0.001
***Fruit Juices /day**					
2-3	4 (7.4)	6 (16.7)	2 (4.8)	2 (4.5)	0.049
1 or few	38 (70.4)	25 (72.6)	30 (73.8)	25 (56.8)	0.049
No	12 (22.2)	4 (11.1)	9 (21.4)	17 (38.6)	0.049

1. Pieces of fruits and vegetable were equals to ½ cup.
2. Assuming coffee, tea, soda drink, fruits, vegetables, meals at restaurant and fruit juices to be 100% per column.
3. Highest values were indicated with bold letters.
4. <0.05 p value was taken significant
¥ Indicates Spearman test.
* Indicates Pearson test.

had low risk of developing stress (p <0.010). On examination 9 (21.4%) people were found to be hypertensive (p <0.642). On average, people of low middle income class took 2073.50±1023.50 kilocalories. Diet of this class consumed average protein (64.75±44.374g), average carbohydrate (40±190.94g) and average fat (64.75±44.37g) (Table-1). In this class 3 (7.1%) people were found to be using medications (p <0.003) and 6 (14.6%) used multivitamins supplements (p <0.003). In terms of body shape 22 (52.4%) had proportionate body shape (p <0.001) and 34 (81%) people considered themselves as physically active (p <0.364). In this class 26 (61.9%) slept for 6-7 hours/day (p <0.106), 35 (85.4%) took breakfast regularly (p <0.441) and 26 (61.9%) people took 3 meals/day (p <0.260) (Table-2). In this class 2.4% people used artificial sweetener (p <0.001), 22 (52.4%) consumed 1 or few cups of coffee/day (p <0.003), 17 (40.5%)

consumed 2-3 cups of tea/day (p <0.678), 27 (64.3%) consumed 1 or few soda drinks/day (p <0.279), and 30 (73.8%) took 1 or few glass of fruit juice/day (p <0.049). In this class, 27 (64.3%) used 1 or less fruits/week (p <0.002), 12 (28.6%) people used more than 7 vegetables/week (p <0.031) and 23 (23.8%) people had 1 or few meals at restaurant/week (Table-3).

Out of 44 participants of below poverty group, 16 (36.4%) had high, 26 (59.1 %) had moderate and 2 (4.5%) had low risk of developing stress (p <0.010). On examination 8 (18.2%) people were found to be hypertensive (p <0.642). On average people of below poverty group took 1849.54±649.896 kilocalories. Diet of this class consumed average protein (55.84±26.80g), average carbohydrate (258.41±26.80g) and average fat (64.42±30.13g) (Table-1). In this class 9 (20.5%) people was found to use medications (p <0.003) and 2 (4.5%) used multivitamins supplements (p <0.003). In terms of body shape 35 (79.5%) had proportionate body (p <0.001) and 30 (68.2%) people considered themselves as physically active (p <0.364) .In this class, 18 (40.9%) people slept for 6-7 hours (p <0.106), 81.8% took breakfast regularly (p <0.441),29 (65.9%) had 3 meals/day (p <0.260) and no participants were found to use artificial sweetener (p <0.001) (Table-2). In this class 16 (61.4%) took no coffee (p <0.003), 21 (47.7%) took 2-3 cups of tea/day (p <0.678), 21 (47.7%) took 1 or few soda drinks/day (p <0.279), 25 (56.8%) took 1 or few fruit juices/day (p <0.049), 29 (65.9%) took 1 or less fruit/week (p <0.002), 13 (29.5%) took more than 7 vegetables/week (p <0.031), 21 (47.7%) took no meals at restaurant/week (Table-3).

The comparison of data was highlighted in tables.

Discussion

The population of Karachi was divided into four different socioeconomic classes and it was observed that Hypertension was to be highly prevailed among high class and risk factor for development of stress were high among population below poverty line.

The level of stress was found to increase consistently with deteriorating socioeconomic status .Stress was observed to be the highest in the Below Poverty Line SES. This supported the common fact that stress was directly related to financial instability. Findings of our study was also consistent with another study carried out on a similar topic.[11] An interesting observation being, that people of low class rated themselves to be the most physically active in contrast to what was seen in a study conducted in 1988-1994 that shows inactivity was more common among social class where people were less educated and were living below the poverty line.[12]

Another interesting observation was the finding that highest frequency of hypertensive people belonged to the High and High middle SES in contrast to a study.[13] This also supported the fact that High SES was taking the most medications. The people living below the poverty line were least likely to have hypertension in contrast to another study.[14]

The nutritional analysis of the different socio economic classes portrayed the highest intake of calories to be consumed by the Low middle socio economic class. This was in contrast to what was found in the high class, theirs being the lowest calorie consuming SES of Karachi city. This finding could be correlated to the fact that people belonging to high SES were found to be generally more diet conscious. They adapt dietary restrictions more than the people of low middle SES. Also High SES was found to include vitamins and other dietary supplements in their routine diet as indicated by previous survey.[15] Another factor being that they also are the class with the highest percentage of people using artificial sweeteners.

High regularity of having breakfast was found in the High SES while below poverty line SES was associated with skipping breakfast as was seen in studies.[11]

Further results show highest fats being consumed by the High middle SES, in contrast to previous research in which lowest fats were consumed by higher income group. This finding correlated to the deduction that greater percentage of people having an apple and pear shaped body type belongs to the High SES in contrast to a study conducted earlier.[15]

The people below poverty line were found to possess mostly, the proportionate type of body and people of low middle income group were more physically active than the other classes. The highest consumption of coffee and soda drink was found to be in High middle income group in contrast to another study,[15] whereas the Low middle income group consumed higher amount of tea among all other groups. One study showed that poor seek food that cost less per calorie e.g wheat, and are greater consumer of vegetables. This confirms with our study too that people of below poverty line consumed more carbohydrates and were also seen to consume more vegetables than other classes.[16]

These findings highlight the complexity of the associations between socioeconomic status and different components of dietary intake.

The limitation of our study is that it is a cross sectional

study encircling a small part of the population of Karachi and may not be representative of the whole scenario of the city. The implicit problem with our data remains the fact that it is a cross sectional survey using self-administered questionnaire and we cannot confirm the anticipated relation of the different SES leading to dietary habits being formed and subsequent nutritional adherence. Similarly relating the possibility of being hypertensive should also have included other factors as age, genetic predisposition and other medical conditions. The major limitation that we faced was during the collection of data, and it was that our questionnaire for the diet was very intensive which did not attract many people from working class to give interview to us. But, it was necessary to get an accurate and a detail day to day dietary intake data to calculate calories, fat, protein, and carbohydrate intake and due to this reason we kept the margin of error to 7% for the sample size.

Conclusion

This study suggests that Hypertension was a common problem found in the higher socioeconomic strata, while stress was prevalent more among the low socioeconomic classes.

The dietary relationships between class and calorie intake were complex contradictory to the common belief as low class was found to have a higher intake of calories, but the high socioeconomic class sticks to a low calorie, and a supplemented diet pattern. Awareness need to be created to about taking regular medications for hypertension and improving dietary pattern among lower socioeconomic strata.

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