

Correlation Between Dietary Applications in Hypertensive Patients and Eating Disorders

Hipertansif Hastalarda Diyet Uygulamaları ve Yeme Bozuklukları Arasındaki İlişki

Gülgün DURAT,^a
Atila EROL,^b
Ayşe ÇEVİRME,^a
Özge KAYNAK,^a
Cennet YILDIZ^c

^aSakarya University School of Health,

^bDepartment of Psychiatry,
Sakarya University Faculty of Medicine,
Sakarya

^cClinic of Cardiology,
Tekden Hospital, İstanbul

Geliş Tarihi/Received: 10.10.2015

Kabul Tarihi/Accepted: 27.12.2015

Yazışma Adresi/Correspondence:

Cennet YILDIZ
Tekden Hospital,
Clinic of Cardiology, İstanbul,
TÜRKİYE/TURKEY
cennet_yildiz@live.com

ABSTRACT Objective: Many studies on prevention and treatment of hypertension show that some special nutrition and diets are effective on blood pressure. The aim of this study is to investigate whether the dietary applications in hypertension patients are correlated with eating disorders or not. **Material and Methods:** The study was conducted in eight different centers among Family Health Centers in Sakarya. The test group consisted of 86 hypertensive patients and the control group consisted of 162 persons. Abnormal eating behaviours, inappropriate weight control methods and psychological status of the patients were assessed through three questionnaires: Eating Attitudes test-26 (EAT); Bulimic Investigatory Test, Edinburgh (BITE) and General Health Questionnaire-12 (GHQ-12). **Results:** The characteristics of the test group and the control group were similar with regard to age, sex and height. Body mass indeks (BMI) and weight of the test group was significantly higher than the control group. Test group had higher EAT score (21.82±12.53 vs 18.85±9.65, p=0.04), BITE score (9.68±2.95 vs 8.75±3.00, p=0.02) than the control group. GHQ-12 of the test group was significantly higher than the control group (11.86±7.10 vs 10.02±6.35, p=0.04). When we compare the two groups in terms of gender, BITE scores of females in the test group were significantly higher than the females in the control group (9.92±2.9 vs 8.86±3.071, p=0.03), whereas GHQ scores of males in the test group were significantly higher than males in the control group (11.73±7.35 vs 8.47±5.71, p=0.03). There was positive correlation between BMI and BITE scores in test group (r= 0.242 p=0.025). **Conclusion:** Eating disorders and psychiatric complications may develop among patients with hypertension. Hence, a diagnosis hypertension should lead to a heightened level of diagnostic suspicion for eating and psychiatric disorders.

Key Words: Hypertension; eating disorders; behavioral medicine

ÖZET Amaç: Hipertansiyon tedavisi ile ilgili yapılmış pekçok çalışma özel beslenme ve diyetin kan basıncı üzerinde etkili olduğunu göstermiştir. Bu çalışmanın amacı hipertansif hastalarda diyet uygulamalarının yeme bozuklukları ile ilişkisini incelemektir. **Gereç ve Yöntemler:** Bu çalışma Sakarya bölgesinde sekiz farklı aile sağlığı merkezinde gerçekleştirildi. Çalışmaya 86 hipertansif hasta ve 162 sağlıklı birey alındı. Anormal yeme davranışları, uygunsuz kilo kontrol yöntemleri ve hastaların psikolojik durumları Yeme Tutum Testi-26 (YTT-26), Edinburg Bulimia Araştırma Testi (EBAT), Genel Sağlık Anketi-12 (GSS-12) ile değerlendirildi. **Bulgular:** Hipertansif grup ile kontrol grubu arasında yaş, cinsiyet ve boy açısından anlamlı fark yoktu. Beden kitle indeksi (BKİ) hipertansif grupta kontrol grubuna göre anlamlı olarak yüksekti. Hipertansif grupta YTT-12 puan ortalaması (21,82±12,53 ve 18,85±9,65, p=0,04), EBAT puan ortalaması (9,68±2,95 ve 8,75±3,00, p=0,02) ve GSS-12 puan ortalaması (11,86±7,10 ve 10,02±6,35, p=0,04) kontrol grubuna göre anlamlı olarak yüksekti. Cinsiyete göre her iki grup karşılaştırıldığında hipertansif grup kadınların ortalama EBAT puanının kontrol grubundaki kadınlara göre anlamlı olarak yüksek olduğu (9,92±2,9 ve 8,86±3,071, p=0,03), hipertansif gruptaki erkeklerin YTT-12 puan ortalamasının kontrol grubundaki erkeklere göre anlamlı derecede yüksek olduğu saptandı (11,73±7,35 ve 8,47±5,71, p=0,03). Hipertansif grupta VKİ ile EBAT puan ortalaması arasında pozitif korelasyon saptandı (r= 0,242 p=0,025). **Sonuç:** Hipertansif hastalarda yeme bozuklukları ve psikiyatrik komplikasyonlar gelişebilir. Bu nedenle, hipertansif hastalarda psikiyatrik komplikasyonlar ve yeme bozukluklarının gelişimi açısından dikkatli olunmalıdır.

Anahtar Kelimeler: Hipertansiyon; yeme bozuklukları; davranış tıbbı

doi: 10.5336/healthsci.2015-48237

Copyright © 2016 by Türkiye Klinikleri

Türkiye Klinikleri J Health Sci 2016;1(2):88-94

Hypertension is a strong, consistent, continuous, independent, and etiologically relevant risk factor for cardiovascular and renal disease.¹ In effect, approximately 25% of the adult population worldwide and its prevalence is predicted to increase by 29% in the year 2025, when a total of 156 billion people will be effected.² Elevated blood pressure (BP) results from environmental factors, genetic factors, and interactions among these factors. Of the environmental factors that affect BP (diet, physical inactivity, toxins and psychosocial factors), dietary factors have a prominent, and likely predominant, role in BP homeostasis. Lifestyle modifications including exercise and dietary changes can lower BP, reduce the need for antihypertensive drugs and lower the risk of BP-related clinical complications. With rare exception, clinical trials have documented that weight loss lowers BP.^{3,4}

A variety of chronic medical illnesses may bring some additional risk of disordered eating.⁵ However, this effect appears to be greatest in medical illnesses, such as type 1 diabetes and phenylketonuria, in which treatment imposes dietary restraint.⁶⁻⁸ Considering the importance of diet in the management of hypertension, patients with this disease may have increased risk for developing eating disorders.

There are few studies that have examined eating disorders in hypertensive patients. In this study we aimed to investigate whether the dietary applications in hypertension patients are correlated with eating disorders or not.

MATERIAL AND METHODS

The study is conducted in eight different centers among Family Health Centers connected to Public Health Directorate in Sakarya. They were chosen with simple random method between March 2012 and May 2013. The test group consisted of 86 hypertensive patients, and the control group consisted of 162 patients who had presented to the same centers with complaints which are not chronic like hypertension. The study was approved by the local ethics committee and each subject were informed consent prior to enrollment.

Hypertension was defined according to seventh report Joint National Committee for detection, evaluation and treatment of high blood pressure, as systolic BP more than or equal to 140 mm of Hg or diastolic blood pressure more than or equal to 90 mm of Hg or those individuals currently taking antihypertensive treatment.¹ In all subjects special laboratory studies for secondary causes of hypertension were performed when considered appropriate on clinical grounds. Patients with pregnancy, hepatic or renal dysfunction, hyperlipidemia, heart failure, ischemic or valvular heart disease, atrial fibrillation, respiratory disease, pulmonary hypertension, diabetes mellitus, significant neurological disease and malignancy excluded from the study.

Abnormal eating behaviours and inappropriate weight control methods were assessed through two questionnaires (Eating Attitudes test-26; Bulimic Investigatory Test, Edinburgh). Body mass index (BMI) (weight (kg)/(height (m)²)) was calculated from weight and height measurements.⁹ Participants psychological situation was measured using The General Health Questionnaire (GHQ).¹⁰

Eating Attitudes Test (EAT): developed by Garner & Garfinkel initially as a diagnostic test for anorexia nervosa, it has been used as a screening method for non-clinical populations.¹¹ The results obtained showed that this test was not yield a specific diagnosis of an eating disorder, but that it was efficient at detecting clinical cases in high-risk populations and identifying individuals with an abnormal preoccupation with their diet and weight. Of the original 40 items in the scale, 14 items eliminated from the EAT-40, as they were considered to be redundant and did not increase predictive power. The new scale, EAT-26, is highly predictive of the complete version. A total score and three subscales (dieting, bulimia and oral control) are generated. A score of 20 or above denotes the existence of disturbed eating attitudes and behaviour, which may indicate the presence of eating related psychopathology, with the subscales giving a profile.¹²

The Bulimic Investigatory Test, Edinburgh (BITE):¹³ This is a 33-item self-report questionnaire that assesses subjects with symptoms of bulimia or binge eating. The BITE consists of two subscales: Symptom Scale, which measures the degree of symptoms present, and the Severity Scale which measures the frequency of bingeing and purging. Results from the symptoms scale were analyzed in this study. The maximum possible score is 30 for Symptom Scale. A symptom score of 20 or more indicates the presence of binge eating; the medium range (10-19) suggests an unusual eating pattern; the low range (0-10) falls within normal limits. The BITE is a well-validated and reliable instrument: the inter-item reliability coefficient was 0.96 for the symptom subscale and the test-retest reliability was 0.86 and 0.68 for non-clinical and clinical groups, respectively.¹⁴ The BITE has been used in numerous samples including adolescents all over the world: it is easy to administer and complete in less than 10 minutes.¹⁵

The General Health Questionnaire (GHQ):¹⁰ This questionnaire was designed to detect individuals suffering from psychopathologic troubles. The GHQ was originally developed as a 60-item instrument, but several shortened versions, including the GHQ-30, the GHQ-28, and the GHQ-12 are available. The GHQ used in this study includes 12 items. Each item has the following 4 answer choices: not at all, no more than usual, more than usual, and much more than usual. Answers can be scored on

a Likert-type scale (0-1-2-3) or as (0-0-1-1) as suggested in the GHQ manual. Validity and reliability studies of the GHQ-12 in Turkey was conducted by Kılıç.¹⁶ Kılıç found that a cutoff score of 1/2 yielded the best sensitivity (74%) and specificity (84%) rates for identifying persons with a DSM-IV or ICD-10 diagnosis.¹⁶

STATISTICAL ANALYSIS

Continuous variables were expressed as mean±SD. Categorical variables were expressed as percentages. Statistical analyses were performed by using SPSS packed programme (version 11.5 software, SPSS Inc. Chicago, Illinois, USA). Mean values for test and control groups were compared using Student's t-test for independent samples. Gender differences between test and control group was compared using chi-square test. Correlations between BMI and scores of EAT, BITE and GHQ were analyzed with Pearson correlation test. P value <0.05 was considered statistically significant.

RESULTS

Among the participants who were diagnosed with hypertension 60 were women, 26 were men. In the control group, 62 were men and 100 were women. There were no statistically differences between two groups with respect to age, gender and height. BMI and weight were significantly higher in test group in comparison with the controls (Table 1).

TABLE 1: Clinical characteristics of the patients.

	Test group (n=86)	Control group (n=162)	P value
	Mean±SD	Mean±SD	
Age (Years)	53.8±13.1	50.3±13.7	NS
Male (n, %)	26 (30.2%)	62 (38.3%)	NS
Female (n, %)	60 (69.8%)	100 (61.7%)	NS
Height (m)	1.6±0.08	1,6±0.08	NS
Female	1.62±0.06	162.87±0.06	
Male	1.73±0.06	1.72±0.07	
Weight (kg)	79.0±13.7	72.5±12.5	<0.001
Female	76.35±12.94	70.42±13.15	
Male	85.31±13.73	76.10±10.59	
BMI	28,5±4,6	25,7±4,9	<0.001
Female	28.73±4.83	26.13±5.61	
Male	28.00±4.27	28.00±4.27	

BMI: Body Mass Index; NS: Nonsignificant.

The average BITE score of the test group was significantly higher than the control group (9.68 ± 2.95 vs 8.75 ± 3.00 $p=0.02$ respectively). The EAT average score of the test group was also statistically higher compared to those in control group (21.82 ± 12.53 vs 18.85 ± 9.65 $p=0.04$) (Table 2). Through these data, it can be thought that eating attitudes and behaviours may be affected in the patients who need to have dietary limitations such as hypertension.

The GHQ score of the test group was statistically higher compared to those in control group (11.86 ± 7.10 vs 10.02 ± 6.35 $p=0.04$) (Table 2). This result indicates that there is an elevated psychiatric morbidity in hypertensive patients.

When we compare the two groups in terms of gender, BITE scores of females in the test group were significantly higher than the females in the control group, whereas GHQ scores of males in the test group were significantly higher than males in the control group (Table 3).

According to GHQ scores, the prevalence of psychiatric morbidity in women were 16.7% and 13.3% in the test and control groups respectively. The prevalence of psychiatric morbidity in men were 23.1% and 1.6% in the test and control groups respectively. According to BITE symptom scale scores, prevalence of abnormal eating behaviour were 55% and 40.3% in women, 42.3% and 40.3% in men in the test and control groups, respectively.

Association between BMI and scores of EAT, BITE and GHQ were analyzed with Pearson correlation. There was positive correlation between BMI and BITE scores in test group ($r=0.242$ $p=0.025$).

DISCUSSION

Chronic health conditions require patients to adhere to prescribed diets, usually for a lifetime. Adherence to specialized diet is often difficult for anyone. This constant awareness of diet and disease treatment can sometimes lead to the development of an eating disorder.¹⁷

TABLE 2: BITE, EAT and GHQ score of the patients.

	Test group (n=86)	Control group (n=162)	P value
	Mean±SD	Mean±SD	
BITE score	9.68±2.95	8.75±3.00	0.02
EAT score	21.82±12.53	18.85±9.65	0.04
GHQ score	11.86±7.10	10.02±6.35	0.04

BITE: Bulimic Investigatory Test, Edinburgh; EAT: Eating Attitudes Test; GHQ: General Health Questionnaire; SD: Standard deviation.

TABLE 3: BMI, BITE, EAT and GHQ score of the patients.

	Test group (n=86)	Control group (n=162)	P value
BMI			
Female	28.73±4.83	26.13±5.61	0.003
Male	28.00±4.27	25.19±3.71	0.003
BITE score			
Female	9.92±2.94	8.86±3.071	0.03
Male	9.15±2.99	8.60±2.91	0.42
EAT score			
Female	21.83±12.18	19.15±10.18	0.14
Male	21.81±13.5	18.37±8.782	0.16
GHQ score			
Female	11.92±7.06	10.99±6.56	0.40
Male	11.73±7.35	8.47±5.71	0.03

BMI: Body mass index; BITE: Bulimic Investigatory Test, Edinburgh; EAT: Eating Attitudes Test; GHQ: General Health Questionnaire.

Hypertension is an important worldwide public health challenge because of its high prevalence and the concomitant increase in risk of cardiovascular and renal disease. Hypertension is important not only for its high prevalence but also because it is a major modifiable risk factor for cardiovascular disease. It poses an important public health challenge. Several observational epidemiological studies have documented that overweight and high salt intake are important risk factors for hypertension.^{18,19} A growing body of evidence has shown that making dietary changes and losing body weight has beneficial effects on the prevention and management of hypertension. A meta-analysis of randomized controlled trials on people with or without hypertension showed that an average weight loss of 5.1 kilograms reduced systolic blood pressure by 4.4 mmHg and diastolic blood pressure by 3.6 mmHg.²⁰ Adequate weight loss reduces the requirement (number and doses) of antihypertensive medications in patients with hypertension.²¹ Thus, making dietary changes and losing weight are effective treatments for hypertension and its complications.

Specific dietary guidelines are essential for the effective management of hypertension. The aim is to provide those who need advice with the information required to make appropriate choices on the type and quantity of the food which they eat.²² The integral role of physical activity and improved nutrition in the prevention and management of hypertension and the relationship between exercise, energy balance and weight control are important parts of nutritional counselling. Improvements in communication between healthcare providers and patients on behavioral goals can be effective in producing increased levels of physical activity and weight loss.²³

Presently, little is known about eating behaviors among patients with hypertension. It is seen that eating attitudes and behaviours of the patients having chronic diseases like hypertension and diabetes may be affected because they are focused on diet lists, weight control and food restrictions.^{24,25}

Since hypertensive patients usually maintain an unhealthy eating pattern, special diets in treatment gain importance.²⁶

In our study, it was found out that the patients with hypertension could develop eating disorders. The average BITE score and EAT score of the test group was significantly higher than the control group. When the BITE and EAT scores were compared as a function of gender, we found that BITE score of females in the test group was higher than the females in control group.

It should be considered, while observing the hypertension patients, that the patient may have eating disorders and disordered eating behaviours; signs and symptoms during scanning should be focused on; risk factors should be investigated. Environmental factors on eating behaviours, obesity, inadequate physical activity and weight control. Their eating habits and physical activities should be investigated and flexible diet programs that they can apply without forcing themselves should be chosen regarding the patients' worries of gaining weight. By planning progressive education programs, it would be useful to increase controlled studies on this subject.

We found an elevated psychiatric morbidity in hypertensive patients. When performing the comparison between the two groups by gender, it was observed that the hypertensive men had higher GHQ scores than normotensive men, indicating more severe anxiety.

Waldstein and colleagues demonstrated that hypertensive individuals had a lower psychological function than normotensive individuals. Prevalence rates of depression and anxiety as high as 36.4%, and 39.4% in female and 32.2%, and 27.4% in male hypertensive patients respectively.²⁸ Patients who experience depression, stress or stress life events, lack of social support/social integration, and low-economic status were at increased likelihood of having hypertension.²⁹

Psychosocial distress could partially account for poor blood pressure control during anti-hypertensive treatment.³⁰ The mechanisms respon-

sible for the impact of psychosocial distress on the therapeutic effect of anti-hypertensive treatment are complex and may be because of direct effect of the BP itself or the consequences of labelling. Psychosocial stress and their associated activation of sympathetic nervous system and stimulation of hypothalamic-pituitary-adrenal axis might explain the reduced positive outcome for anti-hypertensive medication in patients with modestly controlled BP.³¹ Decreased adherence to physician recommendations on medications and lifestyle may be driven by psychosocial factors.³²

CONCLUSION

Eating disorders and psychiatric complications may develop among patients with hypertension. Hence, a diagnosis hypertension should lead to a heightened level of diagnostic suspicion for eating and psychiatric disorders. By consistently assessing key markers of negative body image and unhealthy eating, health care providers can intervene early before these negative attitudes and behaviors progress to serious, life-threatening eating disorders. Appropriate hypertension treatment should also involve early diagnosis and treatment of concomitant psychiatric disorders.

REFERENCES

- Chobanian AV, Bakris GL, Black HR, Cushman WC, Green LA, Izzo JL Jr, et al. The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure: the JNC 7 report. *JAMA* 2003;289(19):2560-72.
- Casas-Agustench P, López-Uriarte P, Ros E, Bulló MS, Salas-Salvadó J. Nuts, hypertension and endothelial function. *Nutr Metab Cardiovasc Dis* 2011;21(Suppl 1):21-33.
- Young CM, Batch BC, Svetkey LP. Effect of socioeconomic status on food availability and cost of the Dietary Approaches to Stop Hypertension (DASH) dietary pattern. *J Clin Hypertension* 2008;10(8):603-11.
- Chockalingam A. Healty weight-healthy blood pressure. *Can J Cardiol* 2010;26(5):259-60.
- Neumark-Sztainer D, Story M, Resnick MD, Garwick A, Blum RW. Body dissatisfaction and unhealthy weight-control practices among adolescents with and without chronic illness: a population-based study. *Arch Pediatr Adolesc Med* 1995;149(12):1330-5.
- Rodin G, Daneman D. Eating disorders and IDDM: a problematic association. *Diabetes Care* 1992;15(10):1402-12.
- Antisdell JE, Chrisler JC. Comparison of eating attitudes and behaviors among adolescent and young women with type 1 diabetes mellitus and phenylketonuria. *J Dev Behav Pediatr* 2000;21(2):81-6.
- Rodin G, Olmsted MP, Rydall AC, Maharaj SI, Colton PA, Jones JM, et al. Eating disorders in young women with type 1 diabetes mellitus. *J Psychosom Res* 2002;53(4):943-9.
- National Institutes of Health. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults: the evidence report. *Obes Res* 1998;6(Suppl 2):51-209.
- Goldberg DP, Hillier VF. A scaled version of the General Health Questionnaire. *Psychol Med* 1979;9(1):139-45.
- Garner DM, Garfinkel PE. The Eating Attitudes Tests: an index of symptoms of anorexia nervosa. *Psychol Med* 1979;9(2):273-9.
- Williams RL. Use of the eating attitudes test and eating disorder inventory in adolescents. *J Adolesc Health Care* 1987;8(3):266-72.
- Henderson M, Freeman CP. A self-rating scale for bulimia. The 'BITE'. *Br J Psychiatry* 1987;150(1):18-24.
- Ghazal N, Agoub M, Moussaoui D, Battas O. [Prevalence of bulimia among secondary school students in Casablanca]. *Encephale* 2001;27(4):338-42.
- Sierra-Baigrie S, Lemos-Giráldez S, Fonseca-Pedrero E. Binge eating in adolescents: its relation to behavioural problems and family-patterns. *Eat Behav* 2009;10(1):22-8.
- Kilic C. General health questionnaire: validity and reliability. *Turkish J Psychiatry* 1996;7(1):3-9.
- Quick VM, Byrd-Bredbenner C, Neumark-Sztainer D. Chronic illness and disordered eating: a discussion of the literature. *Adv Nutr* 2013;4(3):277-86.
- Working Group on Primary Prevention of Hypertension. National High Blood Pressure Education Program Working Group report on primary prevention of hypertension. *Arch Intern Med* 1993;153(2):186-208.
- He J, Whelton PK. Epidemiology and prevention of hypertension. *Med Clin North Am* 1997;81(5):1077-97.
- Neter JE, Stam BE, Kok FJ, Grobbee DE, Geleijnse JM. Influence of weight reduction on blood pressure: a meta analysis of randomized controlled trials. *Hypertension* 2003;42(5):878-84.
- Appel LJ, Champagne CM, Harsha DW, Cooper LS, Obarzanek E, Elmer PJ, et al. Effects of comprehensive lifestyle modification on blood pressure control: main results of the PREMIER clinical trial. *JAMA* 2003;289(16):2083-93.
- Appel LJ, Brand MW, Daniels SR, Karanja N, Elmer PJ, Sacks FM, et al. Dietary approaches to prevent and treat hypertension: a scientific statement from the American Heart Association. *Hypertension* 2006;47(2):296-308.
- Pappachan JM, Chacko EC, Arunagirinathan G, Sriraman R. Management of hypertension and diabetes in obesity: non-pharmacological measures. *Int J Hypertens* 2011;2011:398065.
- Çobanoğlu SÜ, Altuntaş Y, Karamustafaoğlu KO, Şengül A, Çobanoğlu N. [Eating disorders and disordered eating behavior in type 1 and type 2 diabetes mellitus patients]. *Düşünen Adam* 2008;21(1-4):24-31.
- Hudson JL, Lalonde JK, Coit CE, Tsuang MT, McElroy SL, Crow SC, et al. Longitudinal study of the diagnosis of components of the metabolic syndrome in individuals with binge-eating disorder. *Am J Clin Nutr* 2010;91(6):1568-73.
- Meneton P, Kess-Guyot E, Fezeu L, Galan P, Hercberg S, Ménéard J. Distinctive unhealthy eating pattern in free-living middle aged hypertensives when compared with dyslipidemic or overweight patients. *J Hypertens* 2013;31(8):1554-63.

27. Waldstein SR, Jennings JR, Ryan CM, Muldoon MF, Shapiro AP, Polefrone JM, et al. Hypertension and neuropsychological performance in men: interactive effects of age. *Health Psychol* 1996;15(2):102-9.
28. Hong W, Hang B, Liu J. A control study of effect of the psychosocial factors on the patients with hypertension. *Chine Mental Health J* 2000;14(5):318-20.
29. Ames SC, Jones GN, Howe JT, Brantley PJ. A prospective study of the impact of stress on quality of life: an investigation of low income individuals with hypertension. *Ann Behav Med* 2001;23(2):112-9.
30. Yu G, Yang T, Borlongan CV, Stahl CE, Xie X, He J, et al. Influence of psychosocial factors on treatment of elderly Chinese patients with hypertension. *J Geriatr Cardiol* 2007;4(4):202-7.
31. Tennant C. Life stress and hypertension. *J Cardiovasc Risk* 2001;8(1):51-6.
32. Johnell K, Råstam L, Lithman T, Sundquist J, Merlo J. Low adherence with antihypertensives in actual practice: the association with social participation-a multilevel analysis. *BMC Public Health* 2005;5(1):17.