OVERWEIGHT, OBESITY AND HYPERCHOLESTEROLEMIA PREVALENCE IN MEDICAL STAFF FROM A ROMANIAN ACADEMIC COUNTY HOSPITAL – A CROSS-SECTIONAL STUDY –

DOINA ILEANA GIURGIU[1], DORIN IOSIF BARDAC[2]

[1]PhD candidate "Lucian Blaga" University of Sibiu, [2]"Lucian Blaga" University of Sibiu

Keywords: *body mass index, total cholesterol, cardiovascular risk, physician, nurse*

Abstract: *Overweight or obesity combined with hypercholesterolemia can cause significant cardiovascular effects. Study objective was to highlight the medical professions profile in terms of prevalence of these specific cardiovascular risk factors. Body mass index (BMI) and total blood cholesterol (TC) of 300 employees (doctors, nurses, nursing assistants, janitors and auxiliary staff) of an academic emergency hospital were analyzed. Mean age of participants was 43.9 years old, 79.3% of subjects were female, 21% were doctors, 51.3% nurses, 21.7% nursing assistants and janitors; 6% auxiliary staff. 59.3% of study subjects had BMI ≥ 25, 50.6% had TC ≥ 200mg/dl, 71.4% of physicians and 49.3% of nurses were overweight or obese, 57.4% of doctors and 43.5% of nurses had hypercholesterolemia. Overweight and hypercholesterolemia were significantly associated with increased neuropsychological overload wards. The profile of the Romanian healthcare worker is: middle-aged female, overweight or obese, with a total blood cholesterol level of over200 mg/dl.*

Cuvinte cheie: *indice de masă corporală, colesterol sanguin total, risc cardiovascular, medic, asistentă medicală*

Rezumat: *Supraponderea sau obezitatea în asociere cu hipercolesterolemia pot determina efecte cardiovasculare importante. Obiectivul studiului a fost evidenţierea profilului profesiilor medicale în ceea ce priveşte prevalenţa acestor factori de risc cardiovascular. Au fost analizate indicele de masă corporală (IMC) şi colesterolul sanguin total (TC) la un număr de 300 de angajaţi ai unui spital clinic de urgenţă: medici, asistente medicale, infirmiere, îngrijitoare de curăţenie şi personal auxiliar. Vârsta medie a participanţilor a fost de 43,9 ani; 79,3% dintre subiecţi au fost de sex feminin; 21% au fost medici; 51,3% asistente medicale; 21,7% infirmiere şi îngrijitoare; 6% personal auxiliar. 59,3% dintre subiecţii studiului au avut IMC ≥ 25; 50,6% au avut TC ≥ 200mg/dl; 71,4% dintre medici şi 49,3% dintre asistente sunt supraponderali sau obezi; 57,4% dintre medici şi 43,5% dintre asistente au hipercolesterolemie. Supraponderea şi hipercolesterolemia se asociază semnificativ cu secţiile cu suprasolicitare neuropsihică crescută. Profilul lucrătorului român în domeniul medical este: persoană de sex feminin, de vârstă medie, supraponderală sau obeză, cu nivel total al colesterolului sanguin de peste 200 mg/dl.*

INTRODUCTION

According to the estimates of the World Health Organization (WHO), overweight and obesity are the fifth risk factor for mortality worldwide, causing approximately 2.8 million deaths per year.(1) Prevalence estimates for overweight and obesity reaches 1.4 billion adults over 20 years, obesity alone covering over 10% of world population. The causes of this accelerated growth in adult but also children weight reside in substantial changes in lifestyle, with increased intake of high calories in foods, and in the proliferation of predominantly sedentary activities, both in terms of occupational and leisure activities. A number of social and economic factors add to these, because overweight and obesity do not just belong to high-income countries, but also to middle-income countries. There are also occupational factors, of which stress has the most significant influence, mostly in working environments with "high-demand low-control".

Hypercholesterolemia ranks third in the hierarchy of the risk factors for ischemic heart disease mortality, with an estimated 2.6 million deaths per year.(2) Total blood cholesterol level is influenced by a number of factors: diet and genetic factors play important roles. Its association with obesity increases the risk for developing cardiovascular diseases.

Health workers have simultaneous occupational risk factors that act directly or indirectly on the cardiovascular status. Neuropsychological overload or occupational stress arise from the accumulation of specific situations and working conditions of medical professions: work under the pressure of increased social and professional responsibility, interaction with patient's pathology, the pace of the sequence of activities, different work economy, alternating shifts or night shifts, and long work hours, which vary among professions. Burn-out phenomenon is increasingly common, which certifies the effect of acute stress. Studies of large populations of doctors or nurses (3,4,5,6,7) revealed worrying figures regarding the effects of stress. Over a third of the doctors participating in the recent survey from Mayo Clinic in Rochester, Minnesota, showed symptoms of burn-out, increased number of hours spent at work and excessive bureaucracy being the most frequently cited causes.(3)

Most reports on the health of medical staff suggest an increased level of cardiovascular risk expression. Nurses' Health Study (8), the U.S. study conducted in three phases on large

[1]Corresponding author: Doina Ileana Giurgiu, Str. Intrarea Arieşului, Nr. 4, Ap. 48, Sibiu, România, E-mail: giurgiudoina@gmail.com, Tel: +40745 534215

Article received on 04.03.2013 and accepted for publication on 09.05.2013
ACTA MEDICA TRANSILVANICA June 2013;2(2):196-201

groups of nurses, showed a rate of over 60% for overweight and obesity. However, there are few data on the total cardiovascular risk in the medical staff and on the association of risk factors.

Overweight and obesity combined with hypercholesterolemia can cause significant cardiovascular effects in the long run and on short-term, but also a number of side effects, which will decrease medical staff's work capacity and efficiency necessary to support an activity with a high degree of neuropsychological and often physical overload. Obesity is commonly associated with sleep apnea syndrome, which leads to increased cardiovascular risk, but also to poor sleep quality, the onset of fatigue and decreased ability to support the pace and quality of professional activity.(9)

Cardiovascular diseases are the leading cause of illness and death worldwide (10), in Europe alone related costs amounting to almost € 200 billion. Deaths in the European Union reach over 1.9 million per year and exceed 60% of all deaths in Romania.(11) In 2010, in Romania, hospital admissions for cardiovascular conditions were ranked first with a rate of 14.4%.(12) Unfortunately, national statistics do not provide any details about the occupation of hospitalized patients, which would have allowed the isolation of important conclusions regarding the relationship between work and the pathology presented.

Analysis of predisposing factors, such as weight gain and dyslipidemia is an elementary step in understanding the mutual influence work and health exert on each other, in constructing any plan to improve the relationship and eliminate risks arising from this dual "partnership" into which all professionally active adults enter.

Documenting the health of medical staff is essential for accurate mapping of its status, of its relationship with occupation, and evaluation of its influence on the working capacity of medical staff, which directly impacts the quality of care. Medical staff is an important population group in Romania. In 2011, physicians and nurses represented 1.9% of the Romanian employed population.(13)

PURPOSE

The study objective was to present a profile for medical professions from a public hospital of the prevalence of cardiovascular risk factors: overweight and obesity, using body mass index (BMI), and hypercholesterolemia, using total cholesterol (TC); and to carry out an analysis of the correlation of these factors with occupation and wards groups from which study participants originate.

METHODS

The study was conducted in a Romanian Emergency Academic County Hospital belonging to the public healthcare system. Study participants were selected from the employees who participated in the annual occupational health examination and followed all investigative procedures set out in study protocol, during 2012. A total of 300 employees (doctors, nurses, nursing assistants, janitors, orderly, physiotherapists and medical registrars) were included in the study. The wards from which the participants originated were divided into two groups: "hot" wards (HW) – wards with intense activity and increased neuropsychological overload, and "cold" wards (CW), with lower occupational stress. Wards included in the HW group were operating theatres (Surgery, Gynaecology, Orthopaedics, Urology, Ophthalmology, ENT and Oral and Maxillofacial Surgery), Intensive Care Unit, and Emergency Unit. Wards included in the CW group were: Internal Medicine, Cardiology, Haematology and Medical Rehabilitation.

The mean age of the study participants was 43.94 ± 9.023 years old (0.531 SEM). 79.3% of subjects were women, 21% were physicians, 51.3% nurses, 21.7% nursing assistant and janitors, and 6% auxiliary staff; 59.3% belonged to HW and 40.7% belonged to CW.

To calculate BMI, anthropometric measurements were performed using a mechanical weight scale and a stadiometer for adults, calibrated and verified. Blood samples for determination of TC levels were drawn after a fasting period of 8-12 hours, using a C8000 Architect (Abbott Diagnostics), by enzyme-spectrophotometric method.

Overweight (Ow) was defined as BMI between 25.00 and 29.99 kg/m2, and obesity (Ob) as BMI ≥ 30 kg/m2. Hypercholesterolemia (HTC) was defined by NCEP ATPIII recommendations (National Cholesterol Education Panel - Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults, Adult Treatment Panel III) of the National Heart, Lung, and Blood Institute, National Institutes of Health USA, as serum TC level ≥ 200 mg/dl (15).

Statistical analysis was performed using IBM SPSS Statistics 20.0 software. Descriptive data were analyzed: percentage for qualitative variables, mean, standard deviation (SD) and standard error of mean (SEM) for quantitative variables. T-test for independent samples and Chi-square test for differences in qualitative data analysis was used.

RESULTS

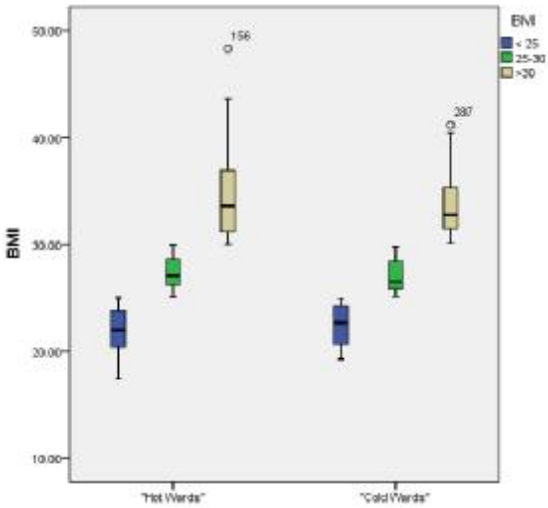
Overweight and obesity

BMI ranged between 17.38 and 48.27, with the overall mean BMI of 26.89 ± 5.24, 27.79 ± 3.91 mean BMI for men and 26.65 ± 5.51 in women. 34% of the participants were within a BMI between 25.00 and 29.99, thus overweight, and 25.3% had BMI ≥ 30, therefore were obese. 59.3% of study subjects had BMI ≥ 25 and were overweight or obese (Ow/Ob).

72.8% of men had Ow/Ob and 29.03% were within in a class of obesity, compared with lower rates in women: 55.88% for Ow/Ob and 24.36 for Ob.

Distribution of BMI ≥ 25 between HW and CW was relatively uniform (56.7% in HW, 63.1% in CW), as well as of BMI ≥ 30 (26.4% and 23.8%), p = 0.286 (> 0.05) (figure no. 1).

Figure no. 1. BMI distribution in the two wards groups



Hypercholesterolemia

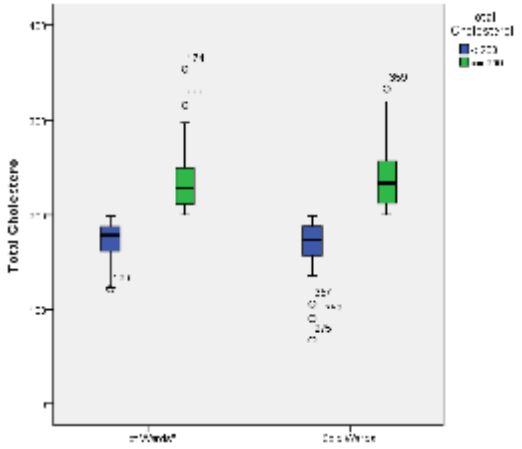
Mean TC throughout the study group was 203.9 ± 41.6, with a range of values between 68 mg/dl and 353 mg/dl. 152 subjects (50.66%) had hypercholesterolemia. There was no

significant difference between genders: 54.83% in men and 49.57% in women.

There was a significant association between TC and wards groups: TC < 200 (55.73%) was predominant in HW, while TC ≥ 200 (55.05%) lead in CW, p = 0.028 (<0.05).

HW mean cholesterol level was 200 mg/dl (M = 206.68 mg/dl, SD = 39.01 mg/ dl); CW mean TC was less than 200 mg/dl (M = 199.86 mg/dl, SD = 44.82 mg/ dl), without incurring significant difference between these environments (figure no. 2).

Figure no. 2. TC distribution in the two wards groups



Overweight/obesity and hypercholesterolemia association

108 subjects (36%) associated Ow/Ob and HTC. Distribution in wards group was: 38.76% in HW and 31.96% in CW. If the case of TC < 200 there was significant association (p = 0.038) between BMI and wards: HW had BMI < 25 in 60% of cases and CW had BMI ≥ 25 in 55.88% cases. When BMI ≥ 25, TC and wards were significantly associated (p = 0.006): HW had TC ≥ 200 in 68.31% cases and CW had TC < 200 in 49.35% of cases (figures no. 3 and 4). 15.66% of the subjects experienced Ob-HTC association, most of them, 65.95%, were in HW. There were similar differences between the genders for the two types of associations – Ow/Ob and HTC: 46.77% in men, compared to 33.19% in women; Ob and HTC: 19.35% in men and 14 7% in women.

Figure no. 3. BMI-TC association distribution in HW

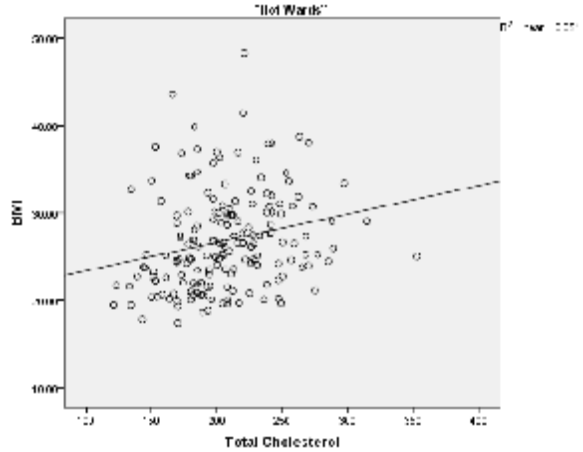
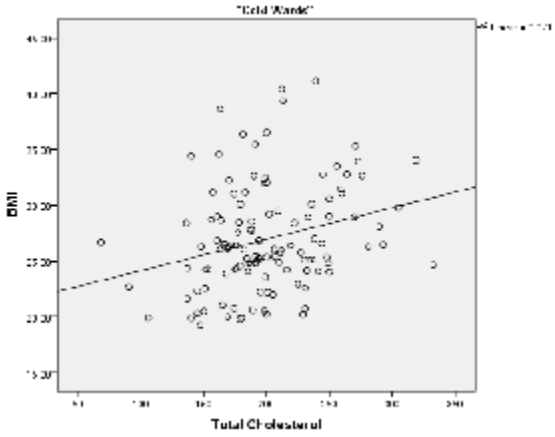


Figure no. 4. BMI-TC association distribution in CW



Relationship between overweight/obesity, hypercholesterolemia, wards and occupation

There was a wide-ranging distribution of mean BMI and TC for the occupations studied. For BMI, upper extremes were: chief physician subgroup with a mean of 29.09 ± 4.41, and nursing assistant with a mean of 30.05 ± 6.01. For TC, upper limits were found in medical registrar subgroup, with a mean of 260.83 mg/dl ± 23.18 mg/dl, and nurse group, with a mean of 222.11 mg/dl ± 38.45 mg/dl.

Physicians group, which included professionals from all hierarchical levels (specialists, seniors and residents) recorded a rate of 57.41% for hypercholesterolemia. However it was exceeded by auxiliary staff – 61.1% HTC, and nursing assistants-janitors – 58.46% HTC, and it surpassed nurses – 43.5% HTC.

An almost identical situation was highlighted in terms of BMI ≥ 25: 71.4% of doctors were overweight or obese, slightly surpassed by nursing assistants-janitors – 73.8%, but not exceeding nurses – 49.3% and auxiliary staff – 50%.

Regarding the association between occupation groups, wards and BMI ≥ 25, there was a statistically significant relation, p = 0.028 (< 0.05) in nurses. There is an almost equal distribution of BMI ≥ 25 in the other professions in the two groups of wards, HW and CW: doctors – 70% and 73.9%, nurses – 44.3% and 56.1%, nursing assistant/janitor – 76.9% and 69.2%.

HW nurses have a higher percentage of HTC (51.13% versus 33.33% in CW), similar to nursing assistants – 66.7% in HW, compared to 46.15% in CW. Auxiliary staff had a reverse situation: 85.7% HTC in CW, compared to 45.5% in HW, while for doctors percentages were similar – 55% in HW and 60.86% in CW. Almost identical percentages of physicians, nursing assistants-janitors and auxiliary staff presented the association Ow/Ob – HTC: 44.44%, 43.07% and 44.44%, but the association was lower in nurses – 28.57%. Ob-HTC association was more present in nursing assistants-janitors group (23.07%) and auxiliary staff (22.22%) compared with physicians group (9.52%) and nurses (14.28%).

DISCUSSIONS

In order to compare data obtained from study group analysis with both WHO definition for overweight (BMI ≥ 25 kg/m2) (15) and that of the European Heart Network (EHN defines overweight as a BMI between 25 and 29.9 kg/m2) (16), but also for differentiating them, we termed overweight (Ow)

following EHN model and Ow/Ob association for overweight in WHO model.

Mean BMI in the study group exceeded by more than one unit in women and more than 2 units in men the WHO estimates of 2008 for Romania (17) and those reported by the International Obesity Task Force and EHF.(11)

According to the same WHO estimates, the overall prevalence of overweight was 35% for adults over 20 years, and the prevalence of obesity was 10% in men and 14% in women. In Europe (11), prevalence varies from country to country, but more than half of men in 34 countries and half women in 21 countries were overweight or obese. For Romania, WHO estimated an Ow/Ob prevalence in adults over 20 years of 48.6% and an Ob prevalence of 17.7%. EHN report has, for Romania, data from the year 2000: prevalence of Ow/Ob in men – 45.8%, in women – 38.1%. All values obtained from the data analysis of this study exceeded the reported or estimated data, in a study/estimate ration of approximately 1.5 for both Ow/Ob and Ob. These data bring arguments for confirmation of the role neuropsychological overload specific for the health sector plays in influencing body weight.

WHO estimates of the mean level of cholesterol in Romania was 4.9 mmol/l (190 mg/dl) in both men and women and the prevalence of hypercholesterolemia (defined as TC $\geq$ 5.0 mmol/l – 193 mg/dl) was 46% in men over 25 years and 45.2% in women of the same age.(11) Considering the limit used in this study – 200 mg/dl – and the higher values found, reference to international estimates underlines the high level of expression of this important cardiovascular risk factor in the target population.

Physician's Health Study showed that 50% of male physicians were overweight or obese.(18) Although the number of doctors in our study is far from the impressive figures of the American cohort and given that U.S. prevalence of obesity is higher than Europe's, it should be noted that the prevalence found by us is 1.5 times higher. The same study highlighted the direct relationship between BMI and mortality from cardiovascular causes.

The first phase of the Nurses' Health Study showed 39% prevalence for Ow/Ob in nurses.(19) A report on subsequent phase of the same study showed a direct relationship between weight gain from age 18 and cardiovascular mortality.(20) Trossman, commenting on the issue of increasing BMI in nurses, cited a 60% prevalence of Ow/Ob in same American study.(21) American Nurses Association conducted a health risk assessment at its 2012 conference and found that 70% of nurses were Ow/Ob, at a mean age of 50 years.(22) A study on a sample of 2494 nurses and midwives from Australia, New Zealand and United Kingdom (23), with a mean age of 42.8 years, assessed by questionnaire, reported prevalence for Ow/Ob of 58.7 %, highlighting alternating shifts impact on body weight increase. Another survey from the same group of researchers (24) and also other reports (25,26) found a direct relationship between alternating shifts, particularly night shifts, and obesity prevalence. Percentage (approximately 50%) found by our study, at mean age of 41 years and variation range between 25 and 64 years, indicates high expression of this risk factor, which exceeds estimated prevalence for Romania.

The study also highlights the status of BMI and TC of a less studied group: nursing assistants and janitors, which, in the hospital from which our population group was selected, as in most public health facilities in Romania, perform the same kind of activity, in fact a combination of nursing assistant and janitor work. Both in terms of Ow/Ob and HTC, this group exceeds or is at the same high level as doctors and nurses. This requires further investigation of the share action occupational risk and lifestyle factors have.

SEPHAR I study (27) conducted in Romania in 2005, on a population of 2017 subjects over 18 years, found, by direct measurements, an overall prevalence of obesity (by BMI) of 24%, a figure close to the overall prevalence found by our study. However, difference between representations of genders (F/M) is quite high: 3.83 in this study and 1.08 in SEPHAR I study. The same study reported a 24% prevalence of hypercholesterolemia, over 2 times lower than prevalence identified by us in medical staff, which brings an additional argument in favour of the influence occupational stress has on the cardiovascular risk.

The vicious circle of the relationship between high levels of occupational stress, obesity and high cardiovascular risk includes many self-conditioned and self-supporting aspects. One of them, apparently more common in women, who form the overwhelming majority of nurses, nursing assistants and janitors, but also a significant percentage of doctors, is a particular eating behaviour – ***stress-eating*** or compulsive eating (28), which often combines lack of regular exercise, inevitably leading to weight gain. Another aspect signalled by American researchers is physicians participating in numerous professional meetings where, invariably, food served does not seem to be part of the recommendations of nutritionists. This food is calories rich, has high levels of lipids and carbohydrates, and lacks or has insignificant amount of fresh fruits, vegetables and fibres.(29)

Other common problems for many demanding professions are improving eating habits, daily rhythm of meals and dinner hours. Recent years brought a change in eating behaviours, with an increase in calories and nutrient intake in the afternoon and evening hours (30), which, correlated with low or moderate physical activity during the day, and little to none in the evening, lead to evident conclusions on the causes of weight gain.

Alternating shifts, night shifts and work dissimilarities within the medical professions are important elements to be taken into account in any assessment of the influence occupational activity has on health. Wards with increased work pace and neuropsychological overload, as wards gathered here under the label "hot wards" (operating theatres, emergency and intensive care units) bring extra pressure on health. Quantifying the effect of this additional burden include, with priority, cardiovascular risk assessment, which encompasses measuring BMI and TC. The fact that HTC and Ow/Ob – HTC association had a higher prevalence in these units validates the hypothesis of a direct relationship between occupational stress and cardiovascular risk.

Directions for future research

For an overall assessment of cardiovascular risk in medical staff, research should continue by analyzing further elements: LDL and HDL cholesterol, triglycerides and blood glucose, smoking, blood pressure, diabetes. It should also quantify occupational stress and its relationship with cardiovascular risk for this occupational category.

CONCLUSIONS

The general profile of healthcare worker is: 44 year old female, overweight or obese, with total blood cholesterol level of 200 mg/dl. Physician profile is: 47 years old male, overweight or obese, with total blood cholesterol level of 200 mg/dl. Nurse and nursing assistant profile is: 41 years old female, overweight or obese, with total blood cholesterol level of 200 mg/dl.

Medical staff is a particularly different occupational category in what concerns its activity, neuropsychological load, work schedule, pace and especially work responsibility, as compared to other professions. The pressure each of the occupational risk factors puts on health is variable, but when they converge and act in concert, the results are visible and measurable. Cardiovascular risk is present and expressed through changes in biological and anthropometric parameters. Individual level and significant association of the cardiovascular risk factors considered in this study (BMI and TC) indicate the influence of occupational determinants.

Acknowledgement:

Research carried out within the framework of POSDRU/CPP107/DMI1.5/S/76851 project, co-financed by the European Social Fund through the Sectoral Operational Programme Human Resources Development.

REFERENCES

1. World Health Organization – Obesity and Overweight. Fact Sheet N°311. Updated March 2013. [Online]. 2013 [cited 2013]; Available from URL: http://www.who.int/mediacentre/factsheets/fs311/en/.
2. World Health Organization - Global Health Observatory (GHO). Raised cholesterol. [Online]. 2013 [cited 2013]; Available from URL: http://www.who.int/gho/ncd/risk_factors/cholesterol_text/en/.
3. Shanafelt TD, Boone S, Tan L, Dyrbye LN, Sotile W, Satele D, West CP, Sloan J, Oreskovich MR. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. Arch Intern Med. 2012 Oct 8;172(18):1377-85.
4. Rauchenzauner M, Ernst F, Hintringer F, Ulmer H, Ebenbichler CF, Kasseroler MT, Joannidis M. Arrhythmias and increased neuro-endocrine stress response during physicians' night shifts: a randomized cross-over trial. Eur Heart J. 2009 Nov;30(21):2606-13.
5. Steptoe A. Night shift work and the cardiovascular health of medical staff. Eur Heart J. 2009 Nov;30(21):2560-1.
6. Rutledge T, Stucky E, Dollarhide A, Shively M, Jain S, Wolfson T, Weinger MB, Dresselhaus T. A real-time assessment of work stress in physicians and nurses. Health Psychol 2009;28:194-200.
7. Kawachi I, Colditz GA, Stampfer MJ, Willett WC, Manson JE, Speizer FE, Hennekens CH. Prospective study of shift work and risk of coronary heart disease in women. Circulation 1995;92:3178-3182.
8. Baer HJ, Glynn RJ, Hu FB, Hankinson SE, Willett WC, Colditz GA, Stampfer M, Rosner B. Risk factors for mortality in the nurses' health study: a competing risks analysis. Am J Epidemiol. 2011 Feb 1;173(3):319-29.
9. Trossman S. An issue of weight. Calling all nurses to get healthy and reverse a trend. Am Nurse. 2013 Jan-Feb;45(1):1-8.
10. World Health Organization. Noncommunicable diseases country profiles 2011. WHO global report [Online]. 2011 [cited 2013]; Available from URL: http://whqlibdoc.who.int/publications/2011/9789241502283_eng.pdf.
11. European Heart Network and European Society of Cardiology. European Cardiovascular Disease Statistics 2012. [Online]. 2012 [cited 2013]; Available from URL: http://www.ehnheart.org/cvd-statistics.html
12. Institutul Naţional de Statistică. Anuarul statistic 2011. Sănătate [Online]. 2012 [cited 2013]; Available from URL: http://www.insse.ro/cms/files/Anuar%20statistic/07/07%20Sanatate_ro.pdf.
13. Institutul Naţional de Statistică. România în cifre 2012 [Online]. 2013 [cited 2013]; Available from URL: http://www.insse.ro/cms/files/publicatii/Romania%20in%20cifre_%202012.pdf
14. National Heart, Lung, and Blood Institute, National Institutes of Health. National Cholesterol Education Panel – Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults, Adult Treatment Panel III. September 2002 [Online]. 2004 [cited 2013]; Available from URL: http://www.nhlbi.nih.gov/guidelines/cholesterol/atp3full.pdf.
15. World Health Organization. BMI classification. [Online]. 2006, updated 2013 [cited 2013]; Available from URL: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html
16. World Health Organization - Global Health Observatory (GHO). Overweight. [Online]. 2013 [cited 2013]; Available from URL: http://www.who.int/gho/ncd/risk_factors/overweight_text/en/index.html.
17. World Health Organization - Global Health Observatory (GHO). Overweight and obesity. [Online]. 2013 [cited 2013]; Available from URL: http://www.who.int/gho/ncd/risk_factors/overweight/en/index.html.
18. Ajani UA, Lotufo PA, Gaziano JM, Lee IM, Spelsberg A, Buring JE, Willett WC, Manson JE. Body mass index and mortality among US male physicians. Ann Epidemiol. 2004 Nov;14(10):731-9.
19. Manson JE, Willett WC, Stampfer MJ, Colditz GA, Hunter DJ, Hankinson SE, et al. Body weight and mortality among women. N Engl J Med. 1995;333:677-85.
20. Baer HJ, Glynn RJ, Hu FB, Hankinson SE, Willett WC, Colditz GA, Stampfer M, Rosner B. Risk factors for mortality in the nurses' health study: a competing risks analysis. Am J Epidemiol. 2011 Feb 1;173(3):319-29.
21. Trossman S. An issue of weight. Calling all nurses to get healthy and reverse a trend. Am Nurse. 2013 Jan-Feb;45(1):1-8.
22. American Nurses Association. Healthy Nurse [Online]. 2012 [cited 2013]; Available from http://www.nursingworld.org/MainMenuCategories/WorkplaceSafety/Healthy-Nurse.
23. Zhao I, Bogossian F, Song S, Turner C. The association between shift work and unhealthy weight: a cross-sectional analysis from the Nurses and Midwives' e-cohort Study. J Occup Environ Med. 2011 Feb;53(2):153-8.
24. Zhao I, Bogossian F, Turner C. A cross-sectional analysis of the association between night-only or rotating shift work and overweight/obesity among female nurses and midwives. J Occup Environ Med. 2012 Jul;54(7):834-40.
25. Marquezea EC, Lemosa LC, Soaresa N, Lorenzi-Filhob G, Morenoa CR. Weight gain in relation to night work among nurses. Work. 2012;41 Suppl 1:2043-8.
26. Huth JJ, Eliades A, Handwork C, Englehart JL, Messenger J. Shift Worked, Quality of Sleep, and Elevated Body Mass Index in Pediatric Nurses. J Pediatr Nurs. 2013 Mar 29. doi:pii: S0882-5963(13)00095-X. 10.1016/j.pedn.2013.02.032. [Epub ahead of print].
27. Dorobantu M, Bădilă E, Ghiorghe S, Darabont RO, Olteanu M, Flondor P. Total cardiovascular risk estimation

in Romania. Data from the SEPHAR study. Rom J Intern Med. 2008;46(1):29-37.
28. Moore CJ, Cunningham SA. Social position, psychological stress, and obesity: a systematic review. J Acad Nutr Diet. 2012 Apr;112(4):518-26.
29. Lesser LI, Cohen DA, Brook RH. Changing eating habits for the medical profession. JAMA. 2012 Sep 12;308(10):983-4.
30. Almoosawi S, Winter J, Prynne CJ, Hardy R, Stephen AM. Daily profiles of energy and nutrient intakes: are eating profiles changing over time? Eur J Clin Nutr. 2012 Jun;66(6):678-86.