

Association of menopausal symptoms with obesity in Slovak women

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ABSTRACT: A lot of midlife women experience a great deal of menopausal symptoms. Their frequency within a given population may vary and depend on several factors such as age, menopausal status, health factors, including obesity.

This study aims to investigate the incidence of menopausal symptoms among obese and non-obese midlife women, and to evaluate contribution of obesity as predisposing factor for menopausal symptoms to their manifestation.

The studied cohort consisted of 297 women ranging from 39 to 59 years of age. Among them there were 63 women with obesity (body mass index, BMI ≥ 30.0 kg/m²) and of 39 women with abdominal obesity (waist to hip ratio, WHR > 0.89). Women were recruited from the western and middle parts of Slovakia. All participants completed a menopause-specific questionnaire. Anthropometric measurements were taken using the standard anthropometric techniques. All statistical computations were performed by the SPSS 17.0 software programme (SPSS Inc., Chicago, IL).

Stepwise logistic regression analysis demonstrated that increase in facial hair was influenced by age ($p < 0.001$) and obesity ($p = 0.015$). Low backache was influenced by WHR ($p = 0.031$), obesity ($p = 0.008$) and cardiovascular disease ($p = 0.024$). The significant impact of BMI was recorded on the involuntary urination ($p = 0.002$). The menopausal symptom „more clumsy than usual“ was influenced by marital status ($p = 0.044$), hypertension ($p = 0.021$) and the presence of cardiovascular disease ($p = 0.023$). We investigated the effect of menopausal status ($p = 0.010$) and abdominal obesity ($p = 0.035$) on the loss of sexual interest. Herein we present evidence that obesity could be involved in menopausal symptomatology among Slovak midlife women. We demonstrate that obese women have a higher susceptibility to increase in facial hair and backache, and women with abdominal obesity to loss of sexual interest.

KEY WORDS: physiological symptoms, psychological symptoms, menopause, body mass index, waist to hip ratio

Introduction

A high proportion of middle-aged women experience a great deal of menopausal symptoms due to changes in endogenous hormone levels. These can negatively affect women's health and wellbeing. The frequency and intensity of menopausal symptoms within a given population may vary and also depend on several factors such as age, menopausal status, smoking, chronic conditions and socio-demographic profile (Pérez et al. 2009). Obesity might also be an important risk factor for experiencing menopausal symptoms (Pérez et al. 2009, Fernández-Alonso et al. 2010). Obesity was associated with more severe menopausal symptoms among postmenopausal Spanish women (Fernández-Alonso et al. 2010). Women with symptoms of sweats had a statistically significantly higher body mass index (BMI), waist hip ratio (WHR), low density lipoprotein (LDL) level, triglycerides level, glucose level, systolic and diastolic blood pressure (Gast 2010).

Some studies found that higher BMI was associated with increased reporting of vasomotor symptoms (Den Tonkelaar et al. 1996, Chiechi et al. 1997, Wilbur et al. 1998, Freeman et al. 2001, and Gold et al. 2004). The other studies reported that heavier women are at increased risk of experiencing hot flushes (Gold et al. 2000, Gallichio et al. 2005, Daley et al. 2007). The reason that higher value of BMI predisposes to hot flushes remains unexplained. Among the postulates one is that the heat insulation afforded by greater adiposity leads to more hot flushes as the thermoneutral zone narrows during the menopausal transition (Glickman-Weiss et al. 1999, Freedman 2002). However, the others have reported either the opposite effect (Wilbur et al. 1990)

or no association (Mirzainjmadadi et al. 2006). In terms of potential explanations, a high BMI implies greater amount of adipose tissue which converts adrenal androgens to oestrogens. This may, in turn, alleviate menopausal symptoms (Greendale and Gold 2005, Daley 2007).

The significant BMI effects were found for the somatic symptoms and attractiveness. Women who were obese also reported significantly higher somatic symptom scores than women of normal weight or those who were overweight (Daley 2007). The longitudinal study by Li et al. (2005) has documented that increases in weight of more than 5kg were associated with significant increases in somatic symptoms.

This study aims to investigate the incidence of menopausal symptoms among obese and non-obese midlife women, and to evaluate contribution of obesity ($BMI \geq 30.0 \text{ kg/m}^2$) and abdominal obesity ($WHR > 0.89$) as predisposing factors to menopausal symptoms' manifestation.

Subjects and methods

The studied cohort consisted of 297 women ranging from 39 to 59 years of age; mean age 48.46 ± 5.4 years. Among them there were 63 women with obesity ($BMI \geq 30.0 \text{ kg/m}^2$) and of 39 women with abdominal obesity ($WHR > 0.89$). Subjects were recruited from different localities in the western and middle parts of Slovakia via an invitation letter regarding the study, circulated and distributed prior to data collection with the help of local medical doctors. Participants were then interviewed in a medical examination in the morning, and they were investigated with respect to their medical, anthropometrical and life style aspects

at local Health Centres. All participants completed a menopause-specific questionnaire designed by Kaczmarek (2005). They gave written Informed Consent for participation in the study. The women were divided according to their menopausal status into pre-, peri- and postmenopausal, in accordance with the definition of WHO (1996). All anthropometrical parameters were measured by professional anthropologists and the same instruments were used on all subjects. Anthropometric measurements were taken using the standard anthropometric technique.

Data analysis

Associations between obesity and particular menopausal symptoms were analysed by the Pearson's chi-square test and Fisher's exact test. Differences of $p < 0.050$ were considered as statistically significant. A stepwise logistic regression analysis was carried out with presence of menopausal symptom as the dependent variable and menopausal status, age, values of BMI and WHR indices, obesity, abdominal obesity, present living place, marital status, employment, physical exercise, current smoking, cardiovascular disease, hypertension and alcohol consumption as the independent variables (covariates). Only those variables that had values of $p < 0.050$ in the Pearson's chi-square test were included in the logistic regression as dependent variables. All statistical computations were performed by the SPSS 17.0 software programme (SPSS Inc., Chicago, IL).

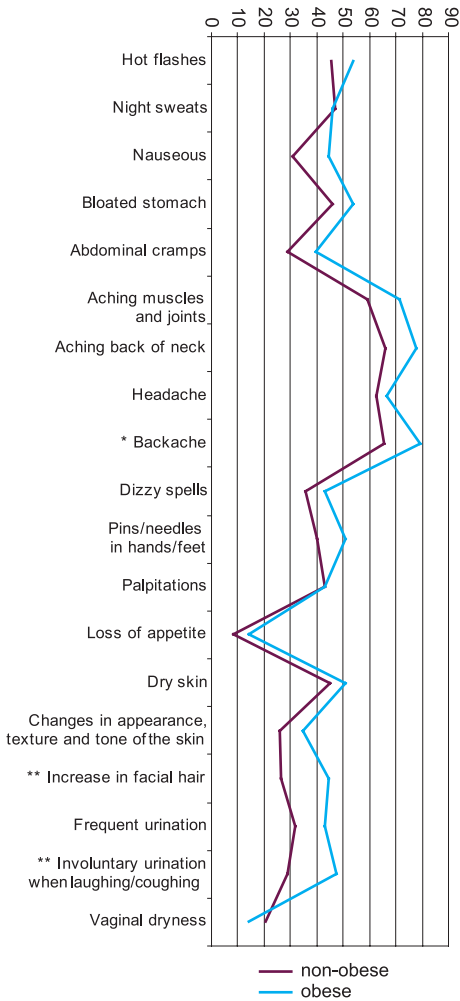
Results

The figures 1 and 2 show the differences between women with and without

obesity in incidence of physiological and psychological symptoms. These figures show that the obese women suffered from menopausal symptoms more often than the non-obese, however, statistically significant differences were observed only in the following complaints: increase in facial hair, backache, involuntary urination when laughing or coughing and clumsier than usual ($p \leq 0.050$). Increase in facial hair afflicted 44.44% of obese women but only 26.50% of non-obese women ($p = 0.008$); low backache: 79.37% vs. 65.38% ($p = 0.047$); involuntary urination: 47.62% vs. 28.63% ($p = 0.006$); clumsier than usual: 23.81% vs. 13.25% ($p = 0.050$), respectively (Table 1).

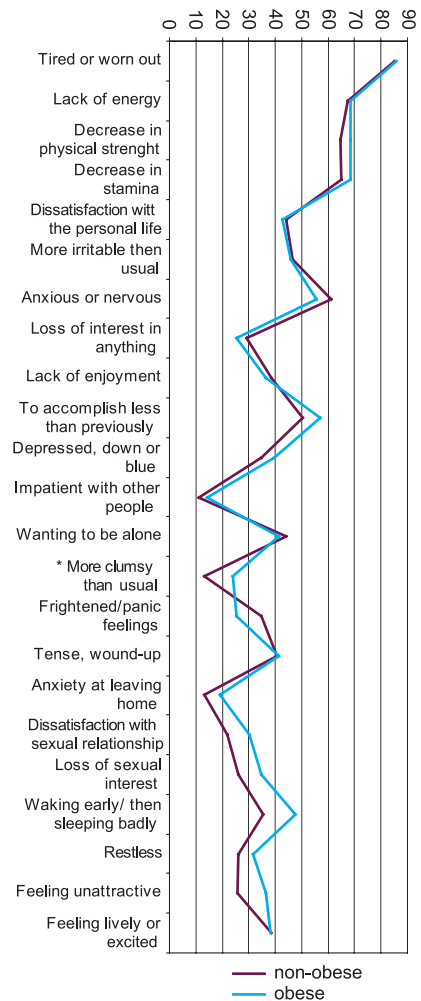
Figure 3 shows the difference in incidence of physiological symptoms between women with and without abdominal obesity. This figure shows that women with abdominal obesity had worse health profile and suffered from physiological symptoms more often than non-abdominal obesity women. However, statistically significant difference was observed only in menopausal symptom „Increase in facial hair“. This symptom afflicted 48.7% of women with the abdominal obesity but only 27.5% of the non-abdominal obese women ($p = 0.014$, Table 2). With respect to psychological symptoms indicated in Figure 4, significant difference was recorded in loss of sexual interest. Women with abdominal obesity suffered from this symptom more often (43.6% vs. 25.6%, $p = 0.034$, Table 2).

The results from stepwise logistic regression analysis in Table 3 demonstrates that increase in facial hair was influenced by age ($p < 0.001$, $\text{Exp}(B) = 1.109$, 95% CI 1.054–1.166) and obesity ($p = 0.015$, $\text{Exp}(B) = 2.103$, 95%



Notes: * $p \leq 0.050$; ** $p < 0.010$

Fig. 1. The incidence of physiological menopausal symptoms in obese and non-obese women (by BMI)



Notes: * $p \leq 0.050$

Fig. 2. The incidence of psychological menopausal symptoms in obese and non-obese women (by BMI)

CI 1.156–3.827). Low backache was influenced by waist to hip ratio ($p=0.031$, $\text{Exp}(B)=0.017$, 95% CI 0.000–0.685), obesity ($p=0.008$, $\text{Exp}(B)=2.797$, 95% CI 1.315–5.948) and cardiovascular disease ($p=0.024$, $\text{Exp}(B)=4.191$, 95% CI 1.205–14.584). The significant impact of BMI was recorded on the involuntary

urination ($p=0.002$, $\text{Exp}(B)=1.085$, 95% CI 1.031–1.143). Further, the regression analysis revealed that the menopausal symptom „more clumsy then usual “was influenced by marital status ($p=0.044$, $\text{Exp}(B)=1.390$, 95% CI 1.010–1.913), hypertension ($p=0.023$, $\text{Exp}(B)=2.932$, 95% CI 1.180–7.291) and the presence

Table 1. The significant associations between obesity and menopausal symptom

Menopausal symptom		Non-obese		Obese		p^a	p^b	Odds ratio	95% C.I.	
		n	%	n	%					
Backache	No	81	34.6	13	20.6	0.034	0.047	2.036	1.045	3.967
	Yes	153	65.4	50	79.4					
Increase in facial hair	No	172	73.5	35	55.6	0.006	0.008	2.219	1.248	3.946
	Yes	62	26.5	28	44.4					
Involuntary urination when laughing/coughing	No	167	71.4	33	52.4	0.004	0.006	2.266	1.282	4.006
	Yes	67	28.6	30	47.6					
More clumsy than usual	No	203	86.7	48	76.2	0.040	0.050	2.046	1.024	4.088
	Yes	31	13.3	15	23.6					

Notes: ^a Pearson's chi-square test; ^b Fisher's exact test (2-sided)

Table 2. The significant associations between abdominal obesity and menopausal symptom

Menopausal symptom		Non-abdominal obese		Abdominal obese		p^a	p^b	Odds ratio	95% C.I.	
		n	%	n	%					
Increase in facial hair	No	187	72.5	20	51.3	0.007	0.014	2.502	1.262	4.962
	Yes	71	27.5	19	48.7					
Loss of sexual interest	No	192	74.4	22	56.4	0.019	0.034	2.248	1.125	4.490
	Yes	66	25.6	17	43.6					

Notes: ^a Pearson's chi-square test; ^b Fisher's exact test (2-sided)

Table 3. The effect of obesity and abdominal obesity on menopausal symptoms considering confounder factors socio-demographic, life-style and health

Menopausal symptom	Variables in the equation	B	S.E.	p	Exp(B)	95% C.I. for EXP(B)	
Increase in facial hair	Age	0.10	0.03	<0.001	1.109	1.054	1.166
	Obesity	0.74	0.31	0.015	2.103	1.156	3.827
	WHR	(-4.08)	1.89	0.031	0.017	0.000	0.685
Backache	Obesity	1.03	0.38	0.008	2.797	1.315	5.948
	Cardiovascular disease	1.43	0.64	0.024	4.191	1.205	14.584
Involuntary urination when laughing/coughing	BMI	0.08	0.03	0.002	1.085	1.031	1.143
	Marital status	0.33	0.16	0.044	1.390	1.010	1.913
More clumsy than usual	Hypertension	1.08	0.46	0.021	2.932	1.180	7.291
	Cardiovascular disease	0.80	0.35	0.023	2.224	1.116	4.432
Loss of sexual interest	Menopausal status	0.70	0.27	0.010	2.021	1.185	3.444
	Abdominal obesity	0.76	0.36	0.035	2.142	1.053	4.358

of cardiovascular disease ($p=0.021$, $\text{Exp}(B)=2.224$, 95% CI 1.116–4.432), respectively. In addition, we found the effect of menopausal status ($p=0.010$,

$\text{Exp}(B)=2.021$, 95% CI 1.185–3.444) and abdominal obesity ($p=0.035$, $\text{Exp}(B)=2.142$, 95% CI 1.053–4.358) on the loss of sexual interest.

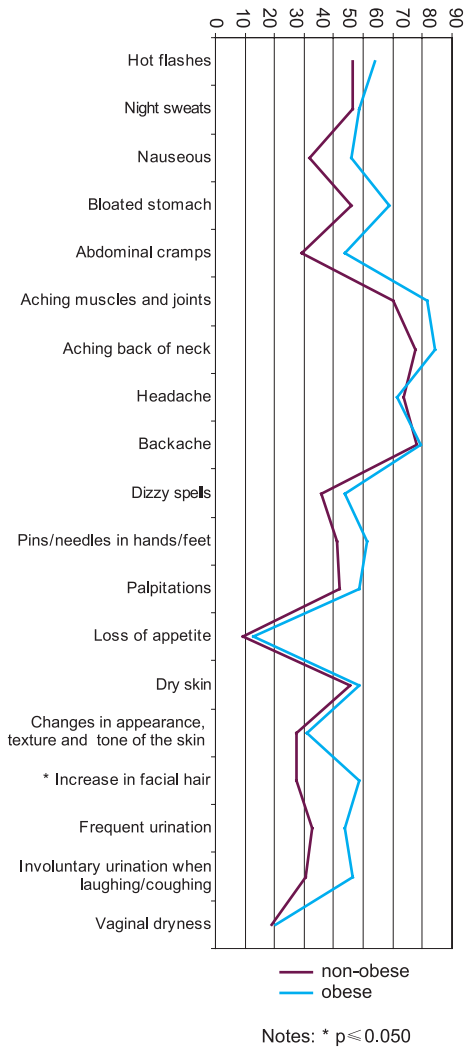


Fig. 3. The incidence of physiological menopausal symptoms in women with and without abdominal obesity (by WHR)

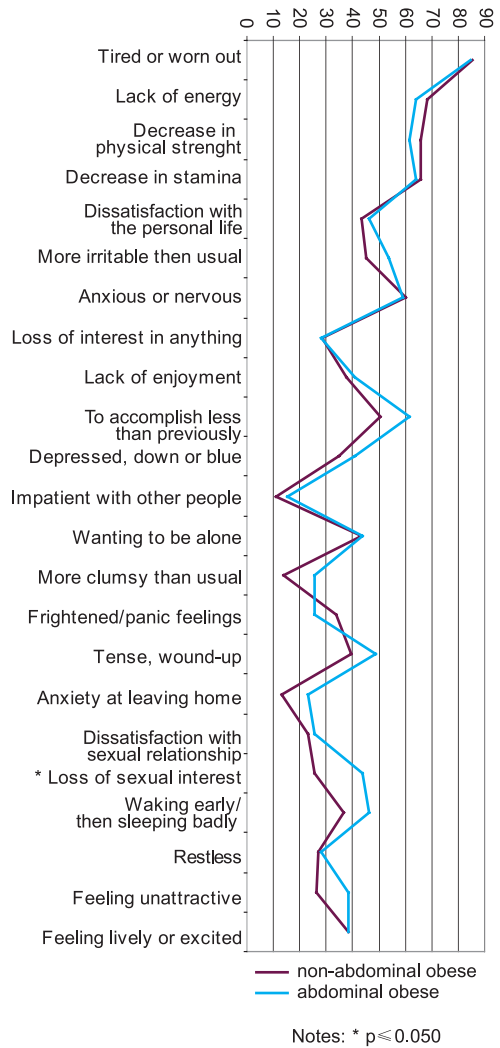


Fig. 4. The incidence of psychological menopausal symptoms in women with and without abdominal obesity

Discussion

Our findings from regression analysis show that increase in facial hair is influenced by age and obesity (by BMI). The study by Barth et al. (1993) also revealed that obesity was significantly associated with an increased facial hair growth. The

greater the duration of obesity the greater the amount of facial hair which is present (Bray 1997). Most problems of excessive facial or body hair can be presented to be androgen-dependent, with higher levels of testosterone in afflicted women. Excess hair growth in obese midlife women may be explained by an associa-

tion between obesity, menopausal transition and hormonal changes/imbalance during this period of life. Concentrations of testosterone have been reported to fall by about 50% during reproductive life, between the ages of 20 and 40. They change little during the transition and may even rise after menopause (Burger et al. 2002). Adipose tissue is also a major site for metabolism of sex steroids (Kershaw and Jeffrey 2004), which could influence increase in facial hair. However, the results from Ruutiainen et al. (1988) indicate that the severe form of increased facial hair "hirsutism" is associated with BMI, independently of age and the testosterone to sex hormone-binding globulin ratio.

In our study, the significant impact of BMI was recorded on the involuntary urination. Similarly, several studies demonstrated an elevated prevalence of urogenital symptoms among obese women (Hannestad et al. 2003, Ozerdogan et al. 2004, Pastore et al. 2004). Sherburn et al. (2001) found that urinary incontinence patients were significantly more likely to have higher BMI than those without incontinence. Hunskaar (2008) concluded that there is clear evidence to support that BMI, WHR and abdominal obesity may be independent risk factors for urinary incontinence in women. In our study, the effect of menopausal status was not confirmed on the involuntary urination in regression analysis. Sherburn et al. (2001) suggest that urinary incontinence in middle-aged women is more closely associated with mechanical factors than with menopausal transition. Their cross-sectional study showed that a high BMI, parity, and having diarrhoea or constipation were significantly associated with urinary incontinence. According to De Lancey (1990) a high

BMI, multiple pregnancies, straining with bowel motions, and lifting/carrying appear to cause mechanical stress on the urogenital tissues. Over time, the collagen support in the pelvic fascia and ligaments weakens and may cause pelvic organ prolapse, which can affect urinary continence.

This study investigated the effect of menopausal status and abdominal obesity on the loss of sexual interest. Similarly, the study of Gianna et al. (2009) demonstrated that increased BMI early in menopause represents a risk of both the urinary incontinence and sexual dysfunction. Llana et al. (2007) reported that obese and/or abdominal obese postmenopausal women were diagnosed with high level of problems in the psychological and also in the sexuality domain.

Some studies found that obesity could affect several aspects of sexuality in women (Esposito et al. 2007) and is associated with lack of enjoyment of sexual activity, lack of sexual desire, difficulties with sexual performance, and avoidance of sexual encounters, especially in women (Kolotkin et al. 2006).

Women from Ecuador with abdominal obesity (waist circumference > 88 cm) were found to have higher rates of muscle and joint aches, abdominal obesity was also found as a significant risk factor for presenting hot flushes and depression. The abdominal obesity increased the risk for hot flushes twofold (Chedraui et al. 2007). This is consistent with the findings of other researchers (Den Tonkelaar et al. 1996, Wilbur et al. 1998, Whiteman et al. 2003). However, our study based on investigated Slovak midlife women did not confirm these results. We found no association between vasomotor symptoms and obesity/abdominal obesity.

Conclusion

Herein we present evidence that obesity could be involved in menopausal symptomatology among Slovak midlife women. From the selected variables we demonstrated that obese women have a higher susceptibility to increase in facial hair and backache, and women with abdominal obesity to loss of sexual interest.

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Author contribution

All authors contributed to data collection and management; LL, processed data and prepared manuscript; DS revised the manuscript.

Conflict of interest

The authors declare there is no conflict of interests.

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