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Menopause-specific Quality of Life Questionnaire: factor and Rasch analytic approach

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ABSTRACT

Objective: The study aimed to assess the psychometric properties of the Menopause-specific Quality of Life Questionnaire (MENQOL) in Serbian climacteric women.

Methods: Two hundred mid-aged (40–65 years) women filled out a general sociodemographic and medical questionnaire, the MENQOL, the Short Form-36 questionnaire (SF-36), and Beck's Depression Inventory (BDI). The MENQOL was translated according to recommended methodology and its psychometric properties (internal consistency, discriminant, construct and criterion validity, factor and Rasch analyses) were assessed.

Results: Cronbach's alpha coefficient for the Serbian MENQOL was 0.957 (Vasomotor =0.917, Psychosocial =0.907, Physical =0.928, Sexual =0.913). Corrected item–total correlation coefficients were >0.50 for all items. Factor analysis extracted six domains with total variance of 72.02%. Beside the four original domains, two new domains were observed: Attractiveness and Pain. Factor loadings for all items were appropriate (>0.4). The MENQOL correlated with the SF-36 and BDI total scores, suggesting good criterion validity. Rasch analysis showed adequate reliability (item =0.91; person =0.79) and separation (item =1.95; person =3.21) indexes, proving good reproducibility and reliability of the Serbian MENQOL. All items had infit and outfit mean squares in the standard accepted range.

Conclusion: Principal component analysis showed somewhat different constructs from the original scale. However, Rasch analysis confirmed that the MENQOL represents a good metric instrument for menopausal symptoms.

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Introduction

The Menopause-specific Quality of Life Questionnaire (MENQOL) addresses the occurrence and the level of disturbance of bothersome physical and psychological issues that women may encounter over the course of menopausal transition¹. The MENQOL has been used worldwide in a variety of cultural backgrounds² and has, therefore, been recognized as a useful instrument in measurement of quality of life among women in perimenopause as well as among postmenopausal women³. A specific value of the MENQOL is assessment of psychosocial health, which has not been investigated in other widely used scales^{4,5}. Consequently, the MENQOL, administered together with other menopause-specific quality of life questionnaires, could be a helpful tool in comprehensive evaluation of phenomena experienced over the menopausal transition⁶.

While the MENQOL is frequently used, few studies have analyzed its item and domain adequacy and application of the MENQOL for different types and subpopulations of

climacteric women. The MENQOL has been assessed previously using a factor analytic approach⁷, but has never been evaluated using a Rasch analysis. The Rasch approach has been commonly used for psychometric assessment of categorical data of self-reported outcome measures and could offer further details of the MENQOL with regards to its construct and adequacy for different populations or point out items that, perhaps, could be altered, refined, or even omitted^{8,9}.

The study aim was to assess the psychometric properties of the MENQOL and validate its current construct in a population of Serbian climacteric women.

Methods

Participants

Consecutive midlife women (perimenopausal and postmenopausal) who had regular gynecological check-ups in two randomly chosen Community Health Centers in Belgrade (one

out of 10 in central districts and one out of seven in suburban outskirts) were recruited for this study from April to July 2015. Menopausal status was ascertained according to the last menstrual period together with menopausal symptoms according to Stages of Reproductive Aging Workshop (STRAW) +10 criteria¹⁰. Inclusion criteria were: age range from 40 to 65 years, good command of Serbian language, and signing informed consent. Exclusion criteria were: verified psychiatric diseases or severe chronic conditions that could otherwise affect quality of life, providing less than 90% of answers, and not fulfilling the inclusion criteria. According to Serbian health regulations, all women older than 18 years should register with the gynecologist at their municipal Community Health Center. Therefore, women of different socioeconomic and educational backgrounds were represented in the study sample. Institutional Review Boards of the two corresponding Community Health Centers approved the study (015-306; 241/15). All women signed informed consent.

Instruments

The MENQOL is a self-administered specific instrument covering 29 climacteric symptoms or complaints. Symptoms are combined into four independent dimensions (i.e. domains): Vasomotor (3 items), Psychosocial (7 items), Physical (16 items), and Sexual (3 items). Respondents indicate whether or not they had experienced each symptom or problem within the past month. In the case of having symptoms, they also rate how bothersome it was on a 7-point Likert scale (from 'not bothered at all' = 0 to 'extremely bothered' = 6). The scoring is performed by adding up the obtained symptom marks. The scores for each of the domains (dimensions/subscales) are calculated as the mean of corresponding item values. The total score represents the mean of the four domain scores. Therefore, the total MENQOL score ranged from 0 (asymptomatic woman) to 232 (extremely bothered for each individual item)¹.

The Short Form-36 (SF-36) questionnaire is the most frequently used generic health-related quality of life (HRQoL) instrument, testing eight different dimensions: Physical Functioning, Role Physical, Bodily Pain, General Health, Vitality, Social Functioning, Role Emotional, and Mental Health. The four former domains comprise the Physical Health Composite Score and the four latter comprise the Mental Health Composite Score. The Total Quality of Life score is calculated as the mean value of the Physical Health Composite Score and the Mental Health Composite Score. Scores in the scale range from 0 to 100 where higher values indicate a better HRQoL¹¹.

Beck's Depression Inventory (BDI) is a 21-item scale designed to measure the severity of depression and the impact of depression on HRQoL. Answers are graded from 0 to 3. A BDI score higher than 21 is considered the cut-off value for presence of depression in the general population¹².

Sociodemographic characteristics and detailed gynecological history were taken from all study participants.

Translation of the MENQOL

Approval for translation into and use of the MENQOL in the Serbian language was obtained from the scale author¹, after conforming to the internationally accepted methodology for cultural adaptation of a questionnaire. The questionnaire, originally developed in English language for Canada, was translated from English to Serbian language (forward translation) by two independent translators. A third translator, who was blinded to the original version of the questionnaire, performed back-translation from Serbian to English language. The back-translated version was examined and approved by the questionnaire author¹. The final approved Serbian version of the MENQOL was tested on 15 perimenopausal women. During this process there were no remarks on clarity and understanding of items. Thus, this version was the final version of the MENQOL in the Serbian language and was used in this validation study.

Statistical analysis

To describe the MENQOL scale, we analyzed minimal and maximal values. Scale reliability was evaluated by testing the internal consistency. The internal consistency of the Serbian version of the MENQOL was assessed using Cronbach's alpha coefficient¹³. This coefficient indicates correlations between scale items. Values above 0.7 are considered statistically appropriate. Discriminating validity of the scale was tested by corrected item-total correlation (CI-TC) analysis. This shows the relationships of one item with the score of remaining scale items. Items with CI-TC ≥ 0.40 are regarded as suitable parts of the scale.

To evaluate construct validity, we performed principal component analysis with varimax rotation. A factor (domain) was extracted if its eigenvalue was above 1.0. Factor loadings represent correlation coefficients between the scale items and the extracted factors. The communality index represents the variance of the scale item accounting for all factors¹⁰. To exclude common method bias (CMB) we performed Harman's single-factor test. The CMB is present in the model if one factor accounts for the majority of the variance¹⁴. Upon obtaining factor loadings, the average variance extracted (AVE) was calculated using the standard formula. AVE values above 0.45 suggest adequate convergent validity of the scale. Moreover, if the AVE of each factor is higher than the squared interfactor correlation, then discriminant validity is appropriate¹⁵.

Moreover, confirmatory factor analysis (CFA) was performed to evaluate the structural model fit of the MENQOL with the four domains. To perform CFA, AMOS software version 18.0 was used. The goodness of fit of the measurement model was evaluated through χ^2 statistics (χ^2/df), the comparative fit index (CFI), the adjusted goodness of fit index (AGFI), and the root mean square error of approximation (RMSEA). Values of χ^2/df (CMIN/DF) below 5.0 and RMSEA below 0.08 together with CFI and AGFI above 0.9 indicated good model fit¹⁵.

Criterion validity of the scale was assessed by correlating (Spearman's correlation) the MENQOL score with the BDI and SF-36 scores (according to domains, composite and total scores). Both the SF-36 and BDI are validated for use in Serbian language^{16,17}. Because the SF-36 and BDI are generic questionnaires, we aimed at comparing the MENQOL as a specific scale to the general scales, which is similar to the original validation study¹.

A contemporary Rasch analysis (probability-based mathematical model) was the method for testing the psychometric characteristics of the MENQOL using Winsteps software (version 4.0.1). The uniqueness of this approach is the evaluation of a person's ability with regard to item difficulty. The results are defined in log-odds units (logits) which are presented on an interval scale (chart). The positive (upper) part of the scale depicts items with greater difficulty and persons with higher ability, while the negative (lower) side represents persons with lower ability and less difficult items^{18,19}.

Person separation denotes instrument measurement precision and reveals how many strata of a person's ability a questionnaire can differentiate. Item separation shows the reproducibility of the instrument and the number of item groups based on their difficulty level. Suitable levels of these two separation indices are ≥ 0.8 . However, as the MENQOL is an instrument for measuring quality of life, which is an entirely individual and subjective feeling that cannot be graded or compared between people, this part of the analysis is somewhat less important in our case and any finding is satisfactory^{18,19}.

Testing the unidimensionality of an instrument by Rasch analysis is an essential part of assessing its composition, and adequacy of the items' fit statistics (infit and outfit) defines how well each item conforms to the single underlying construct, with the infit statistics being superior since it is less sensitive to outlier effects. Appropriate ranges of mean square standardized residuals are inconsistent across the literature^{18,19}, as some authors suggest a more stringent range (up to 1.3)¹⁸, while others¹⁹ allow for a slightly looser range of values (0.5–1.5) representing appropriate fit statistics. In this analysis we took into consideration a wider range suggested by Bond and Fox¹⁹.

Results

A total of 200 perimenopausal and postmenopausal women were included in the study. Women were on average 52.7 (\pm standard deviation [SD] 3.2) years old, had up to eight pregnancies, and had up to three births. The average age of menopause was 51.1 years (\pm SD 3.8 years). Women of perimenopausal ($n=90$; 45%) and postmenopausal ($n=110$; 55%) status were equally distributed in the sample ($\chi^2=2.001$; $p=0.157$).

The highest mean score was achieved for items #1 ('Hot flushes or flashes', $2.09 \pm$ SD 2.07), #3 ('Sweating', $2.04 \pm$ SD 2.11), and #12 ('Aching in muscles and joints', $2.04 \pm$ SD 2.18), while items #21 ('Increased facial hair', $0.86 \pm$ SD 1.51) and #22 ('Change in appearance, texture and tone of your skin', $0.94 \pm$ SD 1.54) received the lowest marks. Still, for all items

the majority of women had answered 'no i.e. lack of symptom – score 0'. As for the MENQOL domains, Vasomotor achieved the highest score (mean \pm SD = 1.98 ± 1.90) and Sexual the lowest (mean \pm SD = 1.30 ± 1.83). The mean MENQOL total score was $1.59 \pm$ SD 1.38 (range 0.00–6.44), which shows that Serbian women were generally not significantly bothered by menopausal symptoms.

Cronbach's alpha coefficient for the entire questionnaire was 0.957. This coefficient based on standardized items was 0.958. According to the domains, Cronbach's alpha coefficient for Vasomotor was 0.917, for Psychosocial was 0.907, for Physical was 0.928, and for Sexual MENQOL was 0.913. Cronbach's alpha coefficient if the item was deleted was above 0.95 for all items (highest if items #9, #12, #20, #21, #22, and #26 were deleted: 0.957). In terms of discriminant validity, the values of the CI-TC coefficient for the MENQOL in the Serbian population were higher than 0.50 for all items (highest for item #7 [0.778] and lowest for item #20 [0.504]).

On principal component analysis we obtained six factors (domains). Apart from the four original factors (Vasomotor, Psychosocial, Physical, and Sexual quality of life), in the Serbian population two new factors (domains) were observed: Attractiveness (items #20 'Weight gain', #21 'Increased facial hair', and #22 'Changes in appearance, texture or tone of my skin') and Pain (items #11 'Flatulence (wind) or gas pains', #12 'Aching in muscles and joints', #15 'Pain in the back of the neck or head', #23 'Feeling bloated', and #24 'Low backache') (Table 1). Factor loadings and communality indices after varimax rotation for all items were appropriate (>0.4). Total variance explained by the extracted six factors was 72.02% (Psychosocial =46.04%; Physical =7.21%; Sexual =5.43%; Vasomotor =4.98%; Attractiveness =4.51%; Pain =3.86%). There was no CMB, as our single factor accounted for less than half of the variance (46.04%).

The Serbian version of the MENQOL with 29 items and the classic four-factorial structure showed a measurement model with an acceptable fit for our population ($\chi^2/df=3.583$; $p=0.001$; CFI =0.782; AGFI =0.916; RMSEA =0.042). The obtained low covariances between factors once again confirmed adequate discriminatory validity of the MENQOL (Supplementary Figure S1). Covariances were the most prominent between Physical and Psychosocial as well as Physical and Sexual domains. This could explain the formation of two new factors on principal component analysis. Therefore, we performed the CFA for the six-factor MENQOL observed in the Serbian population and concluded that the model fit was also adequate, somewhat better, but still quite similar to the original structure ($\chi^2/df=3.120$; $p=0.001$; CFI =0.826; AGFI =0.976; RMSEA =0.030) (Supplementary Figure S2).

Correlation coefficients between the MENQOL and the SF-36 as well as the BDI are presented in Table 2. The MENQOL total score and all domain scores were significantly negatively correlated with both composite SF-36 scores and the SF-36 total quality of life score. The BDI was significantly positively correlated with Psychosocial and Physical domains as well as the total MENQOL score. The MENQOL interfactor correlations are also presented in Table 2. These values were

Table 1. Factor loadings of Serbian MENQOL items and factors extracted after varimax rotation.

Item	Factor loading						
	Original scale domains				New scale domains in Serbian menopausal women		
	Psychosocial	Physical	Sexual	Vasomotor	Attractiveness	Pain	Communality index
#1	0.202	0.302	0.045	0.793	0.183	0.148	0.818
#2	0.249	0.134	0.121	0.853	0.110	0.105	0.845
#3	0.223	0.167	0.157	0.825	0.249	0.129	0.861
#4	0.559	−0.075	0.369	0.391	0.144	0.274	0.703
#5	0.710	0.328	0.155	0.346	0.148	−0.004	0.778
#6	0.650	0.348	0.098	0.256	0.176	0.071	0.655
#7	0.510	0.429	0.380	0.201	0.250	0.135	0.710
#8	0.778	0.142	0.275	0.225	0.044	0.146	0.775
#9	0.747	0.247	−0.034	0.107	0.218	0.080	0.685
#10	0.710	0.092	0.227	0.070	0.090	0.408	0.744
#11	0.384	0.116	0.173	0.224	0.192	0.627	0.671
#12	0.060	0.455	0.250	0.151	−0.031	0.630	0.694
#13	0.318	0.677	0.170	0.187	0.159	0.256	0.714
#14	0.341	0.294	0.258	0.525	0.055	0.282	0.628
#15	0.224	0.275	0.150	0.096	0.286	0.661	0.676
#16	0.166	0.734	0.217	0.182	0.164	0.294	0.760
#17	0.223	0.808	0.166	0.164	0.136	0.217	0.822
#18	0.280	0.779	0.232	0.188	0.205	0.156	0.841
#19	0.127	0.493	0.327	0.247	0.437	0.141	0.638
#20	0.102	0.092	0.199	0.205	0.672	0.123	0.567
#21	0.287	0.058	0.254	0.184	0.592	0.209	0.578
#22	0.095	0.195	0.086	0.064	0.740	0.213	0.651
#23	0.189	0.152	0.092	0.090	0.515	0.595	0.696
#24	0.016	0.302	0.202	0.181	0.332	0.649	0.697
#25	0.155	0.417	0.248	0.152	0.523	0.085	0.563
#26	0.228	0.635	0.186	−0.040	0.365	0.018	0.625
#27	0.199	0.243	0.779	0.066	0.076	0.337	0.829
#28	0.176	0.159	0.787	0.223	0.295	0.133	0.829
#29	0.104	0.265	0.790	0.230	0.155	0.231	0.834

Bold indicates items belonging to the factor. MENQOL, Menopause-specific Quality of Life Questionnaire.

Table 2. Correlation of Serbian MENQOL with Beck Depression Inventory and Short Form-36 scores.

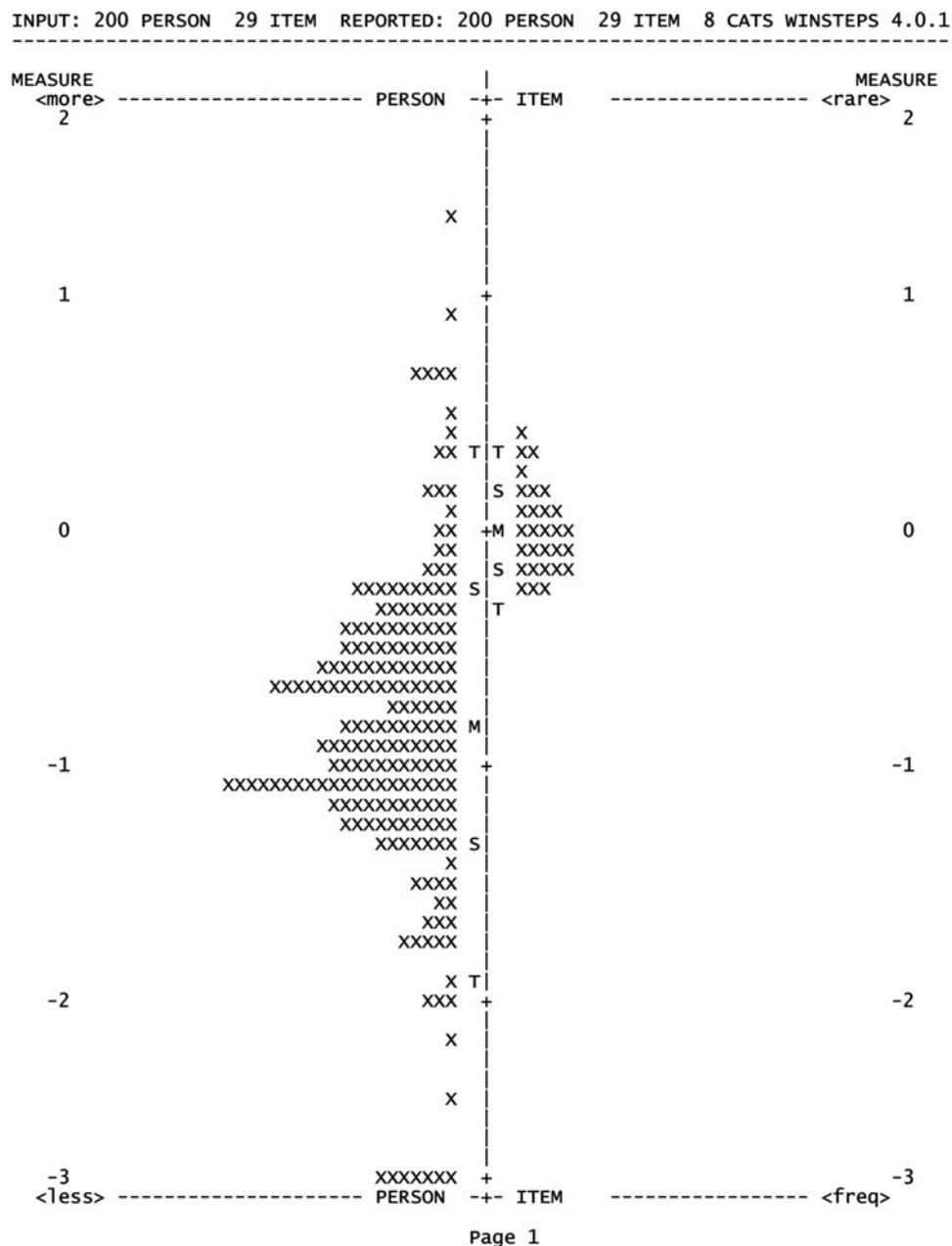
Scale		Vasomotor	Psychosocial	Physical	Sexual	MENQOL total
Physical Functioning	ρ	−0.203	−0.244	−0.073	−0.076	−0.178
	p	0.004	0.000	0.307	0.287	0.012
Role Physical	ρ	−0.112	−0.215	−0.181	−0.152	−0.193
	p	0.113	0.002	0.010	0.032	0.006
Bodily Pain	ρ	−0.058	−0.122	−0.154	−0.118	−0.130
	p	0.417	0.086	0.030	0.095	0.067
General Health	ρ	−0.056	−0.258	−0.231	−0.088	−0.207
	p	0.431	0.000	0.001	0.218	0.003
Vitality	ρ	−0.116	−0.214	−0.184	−0.106	−0.209
	p	0.103	0.002	0.009	0.136	0.003
Social Functioning	ρ	−0.122	−0.133	−0.075	−0.018	−0.091
	p	0.084	0.061	0.294	0.798	0.202
Role Emotional	ρ	−0.102	−0.234	−0.169	−0.134	−0.186
	p	0.149	0.001	0.017	0.058	0.008
Mental Health	ρ	−0.112	−0.267	−0.153	−0.150	−0.215
	p	0.116	0.000	0.030	0.034	0.002
Mental Composite Score	ρ	−0.150	−0.292	−0.214	−0.154	−0.246
	p	0.034	0.000	0.002	0.030	0.000
Physical Composite Score	ρ	−0.156	−0.305	−0.245	−0.180	−0.266
	p	0.027	0.000	0.000	0.011	0.000
Total Short Form-36	ρ	−0.157	−0.320	−0.239	−0.170	−0.267
	p	0.027	0.000	0.001	0.016	0.000
Beck Depression Inventory	ρ	0.065	0.181	0.171	0.093	0.140
	p	0.358	0.010	0.016	0.189	0.048
MENQOL Vasomotor	ρ	–	0.523	0.485	0.260	0.768
	p	–	0.001	0.001	0.001	0.001
MENQOL Psychosocial	ρ	0.523	–	0.617	0.412	0.797
	p	0.001	–	0.001	0.001	0.001
MENQOL Physical	ρ	0.485	0.617	–	0.611	0.818
	p	0.001	0.001	–	0.001	0.001
MENQOL Sexual	ρ	0.260	0.412	0.611	–	0.667
	p	0.001	0.001	0.001	–	0.001

Bold indicates significance. MENQOL, Menopause-specific Quality of Life Questionnaire.

used to obtain squared correlation coefficients between the four MENQOL factors which were as follows: Vasomotor–Psychosocial 0.27; Vasomotor–Physical 0.24; Vasomotor–Sexual 0.07; Psychosocial–Physical 0.38; Psychosocial–Sexual 0.17; and Physical–Sexual 0.37. All squared coefficients were lower than the AVE per domain (Vasomotor 0.79; Psychosocial 0.60; Physical 0.49; Sexual 0.63), suggesting good discriminant validity. The obtained high AVEs showed adequate convergent validity of the Serbian MENQOL.

According to Rasch analysis, the MENQOL reliability index for items is very high (0.91) indicating its adequate reproducibility. Moreover, the obtained separation index (3.21) shows that the MENQOL validated for the Serbian population has three groups of items/symptoms in terms of their difficulty level, which is similar to its original domains (Supplemental Table S1). This finding proves that the MENQOL can be used for menopausal women with different abilities and health status. However, the MENQOL can separate only two (separation index 1.95) types of menopausal women (with good and bad quality of life). Somewhat lower person reliability (0.79) is less relevant in the case of assessing individual and subjective feelings of quality of life that cannot be repeated in the same manner or compared between different women.

The very low standard error of measurement presented in Supplemental Table 2 proves the reliability of MNQOL items. All items have infit and outfit mean squares in the standard accepted range (0.5–1.5). This means that menopausal



Legend: M – mean; S – standard deviation; T – 2 standard deviations

Figure 1. Rasch analysis of the MENQOL: person–item chart. M, mean; S, standard deviation; T, two standard deviations.

women of average health and abilities would have no problems answering all MENQOL questions. Moreover, as almost all correlation coefficients are very close to expectation, our analysis is proven to be successful and the instrument remains adequate.

From Figure 1 we can see that the majority of menopausal women we investigated were similar and around the mean level of health and ability and their menopause-specific quality of life. Moreover, Figure 1 shows that although there were more groups of item difficulty, the difference in item levels was not very significant. The number of items/symptoms above and below the mean difficulty level was almost the same (11 vs. 13 items). However, all MENQOL items corresponded with Serbian women of better health and ability in

menopause. On the contrary, most Serbian menopausal women with lower functional abilities had no items in the MENQOL that would appropriately represent their HRQoL. This explains why the mean values of scale items and persons are far apart. This finding once again stresses the subjectivity and individuality of the quality of life feeling and indicates that more questionnaires should always be used together when assessing menopause-specific quality of life.

Discussion

Overall scores for MENQOL items in our study were lower than those observed in other populations, such as Chinese²⁰,

Arabic²¹, or North American²². Even though the distribution of the most (hot flushes or flashes, sweating, and aching in muscles and joints) and the least (increased facial hair) frequent menopausal symptoms follow the pattern observed in other studies, it seems that Serbian women are less bothered by their menopausal symptoms and that they overall do not affect their quality of life as much as in other populations^{20–23}.

Few studies have reported Cronbach's alpha coefficient for the whole MENQOL, probably due to the fact that the original validation of the MENQOL had not reported this value¹. Cronbach's alpha for the Serbian version of the whole MENQOL was quite high (0.9). The obtained alpha coefficient was higher than in most previous validations worldwide^{1,20,22}, but the same values have been observed in the Persian version²⁴ and in the English version validated in a sample of Australian menopausal women with type 2 diabetes²⁵. These findings might be caused by the fact that the majority of items were similarly scored by Serbian women (most mean item scores were between 1 and 2 points), with only few outliers. In the original validation, alpha coefficients for separate domains were 0.8¹. Other studies observed the same^{20,21} or similar values, with the lowest being 0.7^{25,26}. In the Persian version, however, the Sexual domain had a lower value of 0.3 indicating low reliability, due to cultural background and inconvenience in answering this type of personal question²⁴. Based on the Cronbach's alpha coefficient observed in our study, the Serbian version of the MENQOL has excellent internal consistency. Moreover, although Cronbach's alpha was better if some items were deleted, the change was not significant indicating no need for item omission.

On principal component analysis, four original domains were extracted as well as an additional two domains (labeled Attractiveness and Pain), making a total of six domains for the Serbian version of the MENQOL. The items in the two new domains were all drawn from the original Physical domain. Because we performed a principal component analysis, we aimed at verifying whether or not items in the Serbian MENQOL fit into the given construct as determined by the original questionnaire¹. Local settings (nutrition, employment, economy) and particularities of Serbian women might explain some items that did not factor well into preformed domains. Principal component analysis was not included in the original validation study¹. However, Van Dole et al.⁷ have used this approach for the first time to analyze the MENQOL in English language in a sample of 2703 postmenopausal women. Their analysis confirmed the four-dimensional construct of the MENQOL. Still, the authors observed that four out of five items that did not add statistically significant value to this questionnaire originated from the initial Physical domain⁷. Additionally, on CFA we found that both the original four-domain and the six-domain MENQOL are applicable to the Serbian population as their model fittings were adequate. Further studies on larger samples or using another methodological approach (qualitative and novel psychometric) could provide more information about women who experience MENQOL items in a specific

manner and consequently require a six-domain MENQOL structure to describe menopause-related issues.

Concerning criterion validity, we observed that the Serbian version of the MENQOL correlated with other questionnaires measuring HRQoL and depression. Observed significant correlations of the MENQOL with general as well as menopause-specific HRQoL scales suggest that quality of life among midlife women corresponds well to overall self-reported health and mental well-being. Similar to our study, the Chinese version of the MENQOL negatively correlated with other scales measuring quality of life during the menopausal transition²⁶.

Adequate psychometric characteristics (reproducibility and reliability) of the MENQOL were substantiated using the Rasch analytic approach. The difference in item difficulty was not significant and there were no misfit items. The MENQOL can be used for menopausal women with different abilities and health status. Contrary to principal component analysis, the Rasch analysis extracted three groups of items, which are closer to the original study and other previous validations^{1,20–22}. Consequently, the study authors decided that the original concept of the MENQOL should remain in the Serbian version as well.

Most items corresponded adequately with symptoms and quality of life for women who were of good health and had few menopause-related complaints. Still, the condition and quality of life for Serbian menopausal women of worse health status and/or function in menopause was not appropriately represented by the MENQOL. Due to the proposed scale items and the tested sample in our case the mean of items and the mean of persons are not very close to each other. However, this can be expected and does not decrease the scale validity or reliability significantly. Only in ideal circumstances (absolute normal distribution of responses to scale items that equally represent every person) would these two means be symmetrical (or parallel) on the person-item chart. However, in our study the mean of items matches the actual measuring mean (0 logits), indicating, in fact, adequacy of the scale construct. On the contrary, the person's mean was closer to -1 logits, indicating that, on average, the investigated women had somewhat lower HRQoL in the menopausal transition (probably due to more menopausal symptoms and comorbidities and lesser ability). As a result, it is possible that Serbian menopausal women require an instrument with more items/symptoms. This issue can be remedied by applying several questionnaires together when assessing menopause-specific quality of life⁶.

With regards to study limitations, we selected participants from a metropolitan area of the capital city (center and suburban outskirts), while women from rural areas were not represented in the sample. Moreover, the small sample size due to a somewhat low response rate (200 out of 354 approached women, 56.5%) may limit sample representativeness. The low response rate could be attributed to cultural specificity of Serbian menopausal women who are not used to questionnaires regarding their quality of life and might feel uncomfortable to comment on symptoms that they are experiencing. However, the study included women from

various socioeconomic settings, because Community Health Centers are baseline primary health-care institutions in every municipality. Therefore, our results may be applicable to menopausal women living in other urban areas in the country. To carry out exploratory factor analysis with utmost reliability it is recommended that the sample size in the study is 10 times greater than the number of questionnaire items²⁷. Given the length of the MENQOL, a sample size of 290 would be more appropriate to minimize potential bias. However, the set sampling procedure for this study was based on convenience over a 4-month period. Thus, we calculated the sampling error for our study at a 95% confidence level ($\pm 6.93\%$). The obtained value was not optimal ($<4\%$), but could be acceptable ($<8\%$) suggesting a tolerable representativeness of our survey²⁸. Finally, the applied cross-sectional design precludes inferences in associations between variables and needs careful interpretation.

Conclusion

The Serbian version of the MENQOL for evaluation of quality of life among climacteric women has adequate validity and reliability. Principal component analysis showed that both original and somewhat different constructs (six domains scale) could be applied for Serbian women. However, Rasch and internal consistency analyses confirmed construct strength and item adequacy, making the MENQOL a good metric instrument for assessing the level of disturbance of menopausal symptoms among midlife women.

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