Cultural Adaptation and Optimization of the Compliance Questionnaire-Rheumatology (CQR) Through Statistical Methods for Patients with Rheumatic Diseases

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Abstract

There is a growing interest in the management of long-term conditions and increasing awareness of the need for compliance/adherence's assessment. An inexpensive and simple way to measure patients' treatment compliance is pharmacoeconomic measurement tools.

The aim of the study is to increase the quality of assessment of patients' compliance through statistical methods in order to obtain a more accurate estimation and a shorter, easy-to-respond self-administered questionnaire. We used the Compliance Questionnaire-Rheumatology (CQR) translated into Romanian and we verified the reliability and the internal consistency of this instrument. The research included 140 consecutive patients diagnosed with rheumatoid arthritis according to currently used criteria, with different treatment strategies and from different parts of Romania. Two methods for CQR's optimization were used. The first method identified associations between CQR score and patient compliance. An exploratory factor analysis was performed, as an alternative method, to reduce the number of items in CQR.

The factor analysis identified a two-dimensional 9 item model that explains 66.78% of the variance in adherence and has a good internal consistency and fits the data. A shortened and optimized version of the CQR increases the clinical utility by reducing the patient's burden while maintaining a good level of reliability.

Keywords: Compliance; Adherence; Reliability; Compliance Questionnaire-Rheumatology (Cqr); Pharmacoeconomics.

1. Introduction

More and more, pharmacoeconomic instruments have been used to predict the quality of life of patients, but also to ease efforts to identify associated pathologies. As defined by the US Food and Drug Administration (FDA), PRO (Patient-Reported Outcomes) is "a measurement based on a report that comes directly from the patient about the status of a patient's condition without amendment or interpretation of the patient's response by a clinician or anyone else" (U.S. Food and Drug Administration, 2009). PRO (Patient-Reported Outcomes) can be easily implemented and in the same time can be associated with lower costs because the interval to complete these forms is shorter, and most often no specific training is required in order to complete.

The management of rheumatic diseases is particularly important because they have increased levels of influence on patient's quality of life, mortality, and morbidity, thus the drug therapy plays a major role in the disease outcome. In order to obtain optimal management, there is a need for an accurate understanding of the pathology but, it is clear that the effectiveness of any subsequent therapy depends on each patient's decision to take the treatment correctly or not. Thus, we have several international studies that showed patients suffering from rheumatic diseases are often not compliant with the treatment prescribed by the specialist.

Rheumatic disorders are a group of inflammatory conditions that have similar immunopathological mechanisms. These disorders are characterized by a complex pathology involving multiple organs and systems, thus increasing the rate of morbidity and mortality. As with other chronic rheumatic conditions, besides an accurate periodic clinical and paraclinical evaluation, using modern imaging techniques (Vreju et al., 2016; Filippou et al., 2018), patient adherence to treatment is an important part of therapy success. Since rheumatic diseases involve lifelong treatment, the impact of low adherence to treatment can also influence its effectiveness. A lack of adherence to treatment can be misinterpreted as low efficacy or lack of response to treatment (Anghel, Farcaş & Oprean, 2018).

There are studies (Kardas, 2007; Haddad, Brain & Scott, 2014) which demonstrated that good patient compliance with treatment leads directly to stable clinical effects. Non-compliance causes a number of serious problems in properly managing the medical condition involving very high costs and treatment-related changes. For this reason, measuring and predicting the compliance of a particular patient is a piece of useful information for the optimal management of the disease.

Pednekar (2019) assessed the multiple methods for measuring medication compliance/adherence and self-reported questionnaire was the most used from these methods.

The number of pharmacoeconomic instruments that measure directly the level of adherence or compliance of the patient to drug treatment for rheumatic diseases is quite low (van den Bemt et al., 2009). A single questionnaire was specifically developed to assess patients' compliance to treatment for various rheumatic diseases and is called the Compliance Questionnaire for Rheumatology (Subtirelu, Turcu-Stiolica, Vreju & Neamtu, 2017; de Klerk, van der Heijde, van der Tempel & van der Linden, 1999). The Compliance Questionnaire-Rheumatology (Subtirelu, Turcu-Stiolica, Vreju & Neamtu, 2017, Table 1) is a standardized, self-administrated compliance instrument that can be used by patients diagnosed with rheumatic diseases or specialist in the field of rheumatology. This pharmacoeconomic tool contains 19 questions with four response options (also called the 4-point Likert scale).

Table1. The full Compliance Questionnaire for Rheumatology (CQR19)

	Questions
Q1	If the rheumatologist tells me to take the medicines, I do so.
Q2*	I take my anti-rheumatic medicines because I then have fewer problems.
Q3	I definitely don't dare to miss my anti-rheumatic medications.
Q4	If I can help myself with alternative therapies, I prefer that to what my rheumatologist prescribes.
Q5*	My medicines are always stored in the same place and that's why I don't forget them.
Q6*	I take my medicines because I have complete confidence in my rheumatologist.
Q7	The most important reason to take my anti-rheumatic medicines is that I can still do what I want to do.
Q8	I don't like to take medicine. If I can do without them, I will.
Q9	When I am on vacation, it sometimes happens that I don't take my medicines.
Q10	I take my anti-rheumatic drugs, for otherwise what's the point of consulting a rheumatologist?
Q11	I don't expect miracles from my anti-rheumatic medicines.
Q12	If you can't stand the medicines you might say: "throw it away, no matter what".
Q13*	If I don't take my anti-rheumatic medicines regularly, the inflammation returns.
Q14*	If I don't take my anti-rheumatic medicines, my body warns me.
Q15*	My health goes above everything else and if I have to take medicines to keep well, I will.
Q16*	I use a dose organizer for my medications.
Q17*	What the doctor tells me, I hang on to.
Q18*	If I don't take my anti-rheumatic medicines, I have more complaints.
Q19	It happens every now and then, I go out for the weekend and then I don't take my medicines.

Note: Items denoted with * have been retained in the final 9 items CQR9 questionnaire.

Using an already validated questionnaire has many advantages over the other commonly used methods; it is considered a procedure that is not invasive, it has minimal costs, but can also provide relatively accurate measures of compliance with the actual information provided by the patient. The questionnaire is based on a four-point Likert scale, ranked from "Strongly agree" to "Strongly disagree". A lower score indicates lower levels of adherence. If the adherence score is higher than 80, the patient is adherent to treatment (Subtirelu, Turcu-Stiolica, Vreju & Neamtu, 2018). The time spent by the patient with completing the questionnaire is short, up to 10 minutes.

Regarding the measurement of adherence for rheumatic diseases, there are few pharmacoeconomic instruments in English-language, but in Romanian, there is no validated questionnaire that measures the level of adherence for patients. Usually, people seek treatment at the final stage of the disease, when the various conditions tend to become more serious and lead to functional disabilities, pain, tiredness, even restrictions on social participation. This requires a better understanding of the systematic monitoring of these results, in addition to traditional clinical outcome measurements.

We translated CQR19 (Subtirelu, Turcu-Stiolica, Vreju & Neamtu, 2017) according to international translation guidelines (Beaton, Bombardier, Guillemin & Ferraz, 2000). The translation of the CQR19 was made by two of the authors, native in Romanian language and fluent

in English. Both authors were connected in the health/pharmacoeconomic field. The two translations were carried out independently and for the final version of the questionnaire, both checked out for possible misunderstandings, choosing a final questionnaire. Each item translated must meet certain criteria related to clarity, good understanding in the Romanian language because patients coming from different social environments will respond to the questionnaires.

Our aim was to optimize the CQR19, investigating if it is possible to reduce the number of items in the CQR19 while maintaining internal reliability. A shorter questionnaire would be quicker and easier to administer during a routine outpatient clinic appointment. In the same time, the reduction version allows for the CQR to be incorporated into a battery of questionnaires for research purposes (Turcu-Stiolica, Subtirelu, Vreju & Neamtu, 2018; Subtirelu, Turcu-Stiolica, Vreju, Neamtu, 2017).

2. Methods

2.1. Patients

A total of one hundred forty Romanian patients diagnosed with rheumatoid arthritis (RA) according to currently used criteria, with different treatment strategies (n1=103 patients treated with conventional and n2=37 treated with biologic drugs) were enrolled in this study. The patients were enrolled from the Rheumatology Clinic of Emergency County Hospital Craiova, City Hospital Filiasi and City Hospital Dragasani. The questionnaire was completed under the guidance of a pharmacist and a physician, senior specialist in the field of rheumatology.

The Local Ethics Committee approved this study and patients' informed consent was obtained, during which they were informed of their rights and obligations and other study details.

The diagnosis date for rheumatic conditions is different for each of them, ranging between 2007 and 2018. At the 103 patients we found diseases like: gonarthrosis, spondylosis, acute lumbago, coxarthrosis and most patients claim to have chronic degenerative rheumatism (arthrosis).

The CQR was translated into Romanian (Subtirelu, Turcu-Stiolica, Vreju & Neamtu, 2017) and the final version was optimized after the obtained value of adherence of the RA patients treated with biologics and conventional treatment. In addition to the biological treatment, the patients also had conventional medicines such as: NSAIDs, IPP (pantoprazole) and some OTCs used to treat rheumatic pain.

In Romania, the National Health Insurance House (NHIH) governs health insurance for RA patients (Kawalec et al., 2017). A doctor diagnoses the RA patient and issues prescriptions for symptomatic therapy and synthetic or biologic disease modifying antirheumatic drugs (DMARD) that will be dispensed by a pharmacist in a community pharmacy. The patients could pay a difference for symptomatic drugs, but in the case of DMARDS, the drugs are totally reimbursed by NHIH. More, RA patients treated with biologic DMARDS have better results than the RA patients treated with conventional DMARDS. So, the patients treated with biologics should be more adherent than patients treated with conventional drugs.

The Romanian CQR-19 score was first calculated as the sum of all scored item (every item has the score 1, 2, 3 or 4) minus 19 and divided by 0.57:

$$CQRscore = \frac{\sum Qi - 19}{0.57} \qquad \text{(Equation 1)}$$

A patient is adherent if the score is bigger than 80%.

The influence of demographic factors (age, gender, living place and level of education) was assessed.

2.2. Optimization of CQR19

The use of tests with multiple items is inconvenient for many reasons. One of these is the time consumed with their application; the other may be the uselessness of keeping items whose contribution to the overall score is small or going in a different direction. Identifying and removing

or optimizing these items is one of the objectives of this study. The basic criteria for this operation are the value of the Cronbach alpha index, which has a variation range between 0 and 1.

In our study, we used two methods for optimization of CQR19.

Method I

To adapt and optimize the questionnaire, the CQR score was analyzed using Pearson correlation coefficients. The validity of CQR was assessed by identifying associations between CQR scores and patient compliance. Some of the items in the CQR received a negative score if the patient indicated less compliance. The items of some questions were recoded (score 1→4, 2→3, 3→2, 4→1) to obtain a useful total score, where high scores are related to higher compliance. Test-retest reliability was measured by calculating the intraclass correlation coefficient (ICC), a measure of concordance that corrects for systemic errors (Fleiss, 1986). The number of items was reduced for predicting an acceptable amount of medication adherence. The negative issue regarding the recoding of the elements is that although this may significantly increase the adherence score, the use of inverse questions may reduce the patients' response tendency. If questionnaires are used with inverse questions, they must be carefully formulated, ensuring that they are properly interpreted. Multiple regression analyses were used to obtain the weights that increased the CQR score.

Method II

The self-reporting questionnaire CQR19 was interpreted with a multivariate statistical procedure, Exploratory Factor Analysis, for reducing the number of variables and optimizing it (Williams, Brown & Onsman, 2012). We aimed to reduce the number of items by removing those not adding to the explained variance of the factor, that is adherence, in this study. A factor can be described in terms of the variables measured and their relative importance for the factor. In our questionnaire, variables were measured with the initial 19 items. Therefore, having discovered which factors exist, we analyzed correlation coefficients between responses and factors.

According to Tabachnick and Fidell (2007), the correlation matrix must be inspected for correlation coefficients over 0.30. Factorability of 0.3 indicates that the factors account for approximately 30% relationship within the data, or in this study, it would indicate that a third of the variables share too much variance, and hence becomes impractical to determine if the variables are correlated with each other, or if they are influenced by the dependent variable (multicollinearity). Factor analysis produces a matrix of coefficients (or factor loadings) that describes the interrelationships between the measures under study and the underlying factors (like the correlation coefficients) (Kleinbaum & Kupper, 1978).

Not all factors were retained because we want to assess only treatment adherence of RA patients. This is the reason why we used another approach: Catell's screen test that involves plotting each of the eigenvalues of the factors. The process of deciding how many factors to keep is called extraction. Eigenvalues associated with a variate indicate the substantive importance of that factor (Field, 2013), so we retained only factors with large eigenvalues. The eigenvalues represent the amount of variation explained by a factor and that an eigenvalue of 1 represents a substantial amount of variation. Catell recommended plotting each eigenvalue (Y-axis) against the factor with which it is associated (X-axis), retaining all factors above the elbow, or break in the plot, as these factors contribute the most to the explanation of the variance in the data set (Pallant, 2007). Prior to the extraction of the factors, Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity. A KMO index of 0.5 and significant Bartlett's test of sphericity ($p<0.01$) are considered suitable for factor analysis (Hair, 1995). Once the final model was determined, the internal consistency was tested using Cronbach's α with a threshold of >0.8 being considered as having high internal consistency (>0.7 is a good consistency, <0.7 is considerably questionable).

Statistical analysis was carried out using SPSS version 20.0. The quantitative variables were characterized by the mean and standard deviation (normal distribution), and qualitative variables

with absolute frequency. For qualitative data, the comparison between groups was realized with the Chi-square test (χ^2). For comparison between means of two groups of parametric data of independent samples, student t-test was used. Pearson correlation was used for analyzing two quantitative variables. A p-value <0.05 was considered statistically significant.

In SPSS, patients' data were stored in rows and variables were stored in columns. We had 26 variables (Age, Gender, Environment, Education, Employed, Q1-Q19, Treatment, Adherence Score).

3. Results

The demographic characteristics of the patients in the cultural adaptation and optimization analysis are summarized in Table 2. The mean (± standard deviation) age of the patients was 54.31 (±14.48) years. The majorities of the participants were aged over 40 years (76%) and most were females (66%). The most part of the patients live in the urban environment (73%) and one third have a university background (38%).

Table 2. Demographic characteristics of the patients (n=140)

Patients characteristics	Total (n=140) N (%)	Patients treated with biologic drugs (n=37) N (%)	Patients treated with conventional drugs (n=103) N (%)	χ^2 (p)
Age, yr (mean± SD)	54.31 (±14.48)	51.97 (±12.78)	55.16 (±15.01)	
Min	20	21	20	
Max	83	83	82	
Age category				
18-29	12 (9%)	4 (11%)	8 (8%)	
30-39	12 (9%)	2 (5%)	10 (10%)	
40-49	22 (16%)	7 (19%)	15 (15%)	t=1.148 (p=0.253)
50-59	37 (26%)	13 (35%)	24 (23%)	
60-69	38 (27%)	9 (24%)	29 (28%)	
70+	19 (14%)	3 (8%)	17 (17%)	
Gender				
Male	47 (34%)	7 (19%)	40 (39%)	4.842 (0.028)
Female	93 (66%)	30 (81%)	63 (61%)	
Living place				
Urban	102 (73%)	30 (81%)	72 (70%)	1.720 (p=0.281)
Rural	38 (27%)	7 (19%)	31 (30%)	
Level of education				
8 classes	40 (29%)	4 (11%)	36 (35%)	8.439 (p=0.038)
Highschool	27 (19%)	10 (27%)	17 (17%)	
Post-high school	19 (14%)	5 (13%)	14 (13%)	
University	54 (38%)	18 (49%)	35 (35%)	
Employment situation				
Employee	74 (53%)	23 (63%)	51 (50%)	3.046 (p=0.218)
Pensioner	48 (34%)	12 (32%)	36 (35%)	
Unemployed	18 (13%)	2 (5%)	16 (15%)	

3.1 Method I

Compliance, as measured using different formulas, is summarized in Table 3.
In order to determine the questionnaire questions to be recoded, IBM SPSS Statistics 20.0 is used as a working tool.

Table 3. Compliance value: CQR scores

	Compliance's patients treated with CD Mean (SD)	Compliance's patients treated with BD Mean (SD)	Low adherence (% of patients CD with less than 80% compliance)	Low adherence (% of patients BD with less than 80% compliance)
Initial formula (Equation 1)	57.13 (7.71)	65.86 (7.15)	100%	100%
Recoded formula (5-Q4, 5-Q12, 5-Q19)	56.16 (8.56)	73.49 (10.41)	97%	89%
Weight formula (Q4, Q8, Q9, 5-Q12, 5-Q19)	63.13 (10.90)	77.98 (12.98)	92%	51%

CD=Conventional Drugs, BD=Biologic Drugs

Compliance is done in the following particular cases:

- In the initial version when all 19 questions are considered, coded according to the Likert scale;
- In the recoded version, when certain questions are selected (Q4, Q12, Q19) and recoded;
- In the weight formula where using SPSS, the program considers or not the value of the answers given.

The results obtained with weight formula are better because of the increased values of the CQR score in the case of biologic drugs.

The results obtained in the first case are presented on line 1 of the table. In the current study, for the 103 patients treated with conventional drugs, an compliance of 57.13% with a standard deviation of 7.71 results; this means that the 103 patients are 100% non-adherent to treatment. Also for the 37 patients treated with biological drugs an compliance of 65.86% and a standard deviation of 7.15 was obtained. All 37 patients are non-adherent (non-compliant). These conclusions are erroneous leading to the need to perform the optimization of the questionnaire.

Line 2 of the table presents the results obtained in the case of recoding of questions no. 4, 12, and 19. In this case, the 103 patients treated with conventional drugs showed an adhesion of 56.16% with a standard deviation of 8.56; so 97% of patients are non-adherent to treatment. At the same time, the 37 patients treated with biological drugs have an adhesion of 73.49% with a standard deviation of 10.41. The percentage of non-adherent patients decreased from 100% to 89%. An improvement in the adhesion score is observed for both categories of patients.

3.2. Method II

The measure of sampling adequacy, the Kaiser-Meyer-Olkin (KMO) is considered high at a value of 0.87, so there isn't any problem with the sample size. The KMO can be calculated for individual and multiple variables and represents the ratio of the squared correlation between variables to the squared partial correlation between variables. The KMO statistic varies between 0 and 1.
A value of 0 indicates that the sum of partial correlations is large relative to the sum of correlations, indicating diffusion in the pattern of correlations (hence, factor analysis is likely to be

inappropriate). A value close to 1 indicates that patterns of correlations are relatively compact and so factor analysis should yield distinct and reliable factors.

The test of sphericity of Bartlett is significant ($p<0.001$), so we have at least one significant correlation between two of our items and we can run factory analysis. We don't have any value of less than 0.3 in the communalities table and no items' problems. There were 5 Eigenvalues of >1 which explained 64.03% of the total variance.

According to the parallel analysis, we should retain the same five new factors. We analyzed the component correlation matrix to determine if the new factors are going to be orthogonal or oblique. The values were not greater than 0.5, the new factors presented a weak or moderate correlation.

Table 4. Cronbach's Alpha

Factor	Component from Rotated Component Matrix	Initial reliability Cronbach's Alpha	Cronbach's Alpha if Item Deleted
1	Q1, Q5, Q6, Q15, Q16, Q17, Q19	0.683	0.861 (if Q19 item was deleted)
2	Q2, Q3, Q4, Q13, Q14, Q18	0.615	0.834 (if Q4 item was deleted)
3	Q6, Q7, Q11, Q12	0.251	0.722 (if Q12 item was deleted)
4	Q1, Q8, Q9, Q19	0.019	0.499 (if Q1 item was deleted)
5	Q3, Q10, Q11	0.391	0.471 (if Q11 item was deleted)

After successive Exploratory Factor Analysis, the MSA and factor loadings were recalculated.

Table 4 shows that checking the reliability on each of our factors, we obtained better Cronbach's Alpha if we would delete Q4, Q12, and Q19.

Table 5 shows the outcomes we obtained for every new type of CQR questionnaire if we remove some items.

Table 5 Exploratory factor analysis of the full and reduced versions of the Compliance Questionnaire for Rheumatology

Factor analysis-no. of items	KMO	Items removed	MSA of removed items	Highest factor loading of removed item	Number of items	Total variance explained
1-CQR19	0.870	NA	NA	NA	5	64.028
2-CQR16	0.864	4 12 19	0.303 0.474 0.520	0.452 0.806 0.517	4	63.761
3-CQR15	0.862	7	0.376	0.551	4	65.123
4-CQR12	0.859	1 3 10	0.376 0.309 0.309	0.483 0.606 0.856	4	65.781
5-CQR9	0.855	8 9 11	0. 192 0. 192 0.479	0.818 0.596 0.849	3	62.892
6-CQR9	0.865				2	66.778

CQR19=19 item Compliance Questionnaire for Rheumatology, CQR15=15 item Compliance Questionnaire for Rheumatology, KMO=Kaiser-Meyer-Olkin, MSA=Measure of sampling adequacy

Inspecting Figure 1 of the initial CQR19 we can see a point at which the shape of the curve changes direction and becomes horizontal. We observe in Figure 2 that the final CQR9 has two components with eigenvalue bigger than 1, that reflecting the outcome of compliance.
In Fig.1 is presented a capture of the results obtained with the SPSS program in the case of the analysis of the main components (a component is a group of variables or questions that have a certain characteristic).

Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	6.744	35.497	35.497	6.744	35.497	35.497
2	1.669	8.785	44.283	1.669	8.785	44.283
3	1.349	7.100	51.382	1.349	7.100	51.382
4	1.254	6.602	57.984	1.254	6.602	57.984
5	1.148	6.044	.000	1.148	6.044	64.028
6	.974	5.129	69.156			
7	.873	4.595	73.751			
8	.685	3.606	77.357			
9	.628	3.307	80.663			
10	.554	2.916	83.580			
11	.505	2.658	86.237			
12	.465	2.448	88.686			
13	.402	2.117	90.803			
14	.390	2.054	92.857			
15	.353	1.860	94.716			
16	.312	1.641	96.357			
17	.288	1.516	97.873			
18	.218	1.145	99.018			
19	.187	.982	100.000			

Extraction Method: Principal Component Analysis.

Fig. 1. The total dispersion value for the 19 components resulting from the SPSS analysis

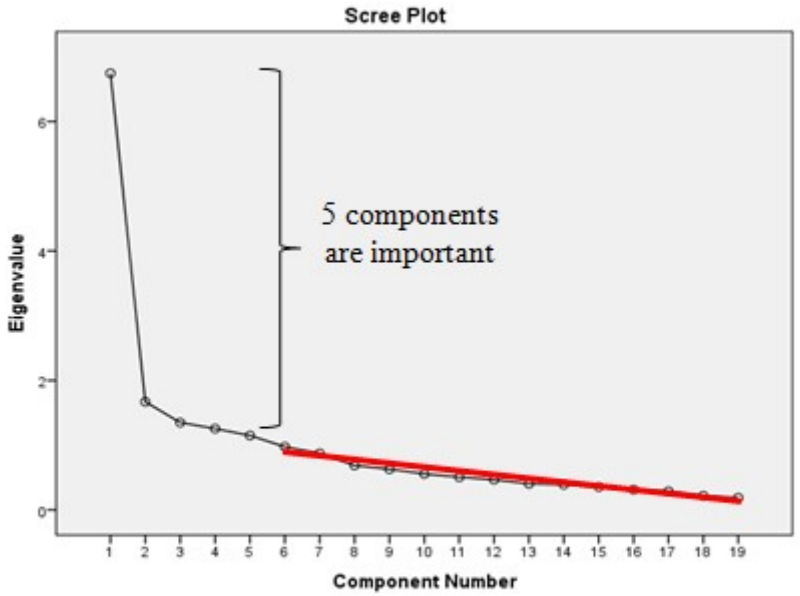

Fig. 2. Scree plot forCQR-19

Analyzing the diagram (method 2, graphics) only those components (factors) those have their own values greater than 1 are retained because these factors contribute most to explaining the variance in the data set. Practically a straight line is drawn over the points that have the lowest Eigen values; there are 5 components (factors, question groups) that are important for the analysis of the study.

According to the parallel analysis, we should keep the same five new factors. The component matrix was analyzed to determine whether the new factors would be orthogonal or oblique. Values were no more than 0.5 and the new factors were weak or moderately correlated.
Once we have obtained the final model, it is tested the internal consistency using the Cronbach index; if the value of this index is greater than 0.8 then we can assume that we have a high internal consistency of the questionnaire; if the value of the index is between 0.7 and 0.8 then we have a good consistency and if the index value is less than 0.7 then we have a weak consistency.

It can be seen from the figure that the last CQR-9 (9 questions questionnaire) has two components with an Eigen value greater than 1 which reflects the adhesion result.

The final value of Cronbach Alpha of 0.865 (see Table 5) suggests a very good internal reliability of the scale coherence of this questionnaire.

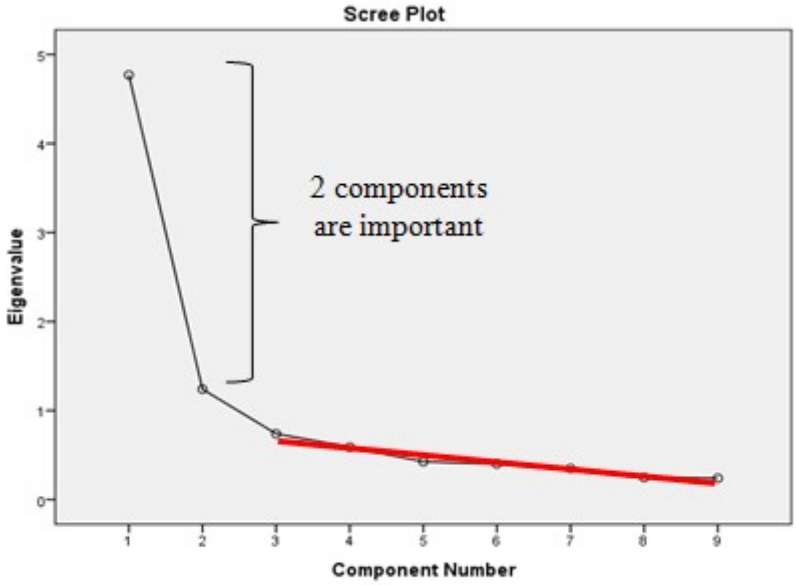

Fig. 3. Scree plot for CQR-9

The final Cronbach's Alpha value (0.865) suggested very good internal consistency reliability for the scale with this questionnaire. The two remaining components show us two different ways to calculate adherence:

- Component 1: Q 5 ("My medicines are always stored in the same place and that's why I don't forget them."), Q6 ("I take my medicines because I have complete confidence in my rheumatologist."), Q15 ("My health goes above everything else and if I have to take medicines to keep well, I will."), Q16 ("I use a dose organizer for my medications."), Q17 ("What the doctor tells me, I hang on to.")
- Component 2: Q2 ("I take my anti-rheumatic medicines because I then have fewer problems."), Q13 ("If I don't take my anti-rheumatic medicines regularly, the inflammation returns."), Q14 ("If I don't take my anti-rheumatic medicines, my body warns me."), Q18 ("If I don't take my anti-rheumatic medicines, I have more complaints.")

Both two final components, like two subscales of compliance, had very good internal reliability: 0.849 and 0.853, respectively. Component 1 emphasizes the belief in rheumatologist and medications. Component 2 emphasizes the fear that not taking the prescribed drugs could lead to distinct worsening of RA symptoms.

CQR9 (Q2, Q5, Q6, Q13, Q14, Q15, Q16, Q17, Q18) will assess the compliance using the formula:

$$CQRscore = \frac{\sum Qi-}{0.27} \qquad \text{(Equation 2)}$$

Using the above formula, patients treated with biological drugs had an adherence average of 81.08% (standard deviation of 14.10) versus 65.86% (standard deviation of 7.15) than they had in the initial case (questionnaire with 19 questions).
Patients treated with conventional drugs had an average adherence of 62.75% (standard deviation of 13.20) versus 57.13% (standard deviation of 7.71) as compared to baseline.

4. Discussion

In this study, we developed and optimized a Romanian version of the CQR for the patients with RA. The original CQR measured compliance in patients with RA, polymyalgia rheumatica and gout (de Klerk, van der Heijde, Landewé, van der Tempel & van der Linden, 2003) and we could forward the next research to patients with other diseases. Noncompliance in RA can lead to brief aggravation of arthralgia, while there is no such immediate effect in gout.

Some authors (Grymonpre, Didur, Montgomery & Sitar, 1998) have suggested that self-reporting is a useful measurement technique if the patient is interviewed at home. However, self-reporting questionnaires still have the inevitable limitation that it is purely subjective. Refill compliance based on pharmacy refill data is a method that best reflects real-life compliance. In Romania, the two health insurance houses (CNAS=National House of Health Insurance and OPSNAJ=House of Health Insurance of Defence, Public Order, National Security, and Judicial Authority) could enable us to measure pharmacy refill data accurately. Thereby, in the case of biologic drugs, we could measure compliance patients with almost 100% accuracy.

Factor analysis allows us to condense a large set of scale items (19) down to a smaller, more manageable number of items (9). The compliance's size obtained with CQR9 formula was closer to reality. The two subscales of CQR9 highlights the fact that psychosocial factors, particularly perceptions, are strong predictors of compliance to anti-rheumatic medication.

This study benefitted from having a substantial sample size and patients that had a large treatment experience as well as different socio and geographic demographics and ages. Although the CQR9 performed well compared to the CQR19, the next step would be to validate the reduced version against a measure of adherence to determine the sensitivity of assessment of suboptimal adherence in a more objective manner.

5. Conclusions

In conclusion, we optimized the Romanian version of a compliance questionnaire for rheumatoid arthritis. It showed adequate reliability for clinical application.

Thus, the new optimization questionnaire responds to the needs of the target population in Romania with adequate reliability for the following clinical applications.

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