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Validity and Reliability of Turkish Version of Wender-Utah Rating Scale for Attention Deficit Hyperactivity Disorder in Adults

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SUMMARY:

Objective: To determine reliability and validity of Turkish form of the 25 item Wender Utah Rating Scale (WURS), which is designed as an aid for diagnosis of Attention-Deficit/Hyperactivity Disorder (ADHD) in adults.

Method: The scale was administered to 59 patients who were diagnosed as having ADHD according to DSM-IV criteria after comprehensive psychiatric and neuropsychological assessments in outpatient clinics of University of Ankara Medical School, Department of Psychiatry. Control groups consisted of 59 patients with depression, 44 patients with bipolar affective disorder in remission, and 145 healthy controls. Subjects who were illiterate and younger than 18 years of age were excluded from the study. WURS was readministered to 63 of the healthy controls after 4 weeks.

Results: Principal components analysis revealed 5 factors explaining 61.3 % of the variance. The factors were labeled as Irritability, Depression, School Problems, Behavioral Problems/Impulsivity and Attentional Deficits. Mean factor scores of ADHD group was higher than all groups except Depression factor. Turkish form of WURS demonstrated excellent internal consistency (Cronbach's alpha= 0.93), and the test-retest coefficient for the WURS (total score) was 0.81. Item-total score correlations varied between 0.31-0.75. A cut off score of 36 or higher identified 82.5% of the adults with ADHD (sensitivity), 90.8% of the healhty controls (specifity), 66% of patients with depression, and 64.3% of patients with bipolar affective disorder correctly.

Conclusion: Turkish form of the WURS is a reliable and valid scale in assessing childhood sypmtoms in adults for ADHD. However overlapping mood disorder items lowers spesificity of the scale.

Key Words: Attention-Deficit/Hyperactivity Disorder, Wender Utah Rating Scale, adult, reliability, validity

INTRODUCTION

The opinion that Attention Deficit/Hyperactivity Disorder (ADHD) could only be seen in childhood and adolescence and ADHD related problems declined by time was changed by the follow-up studies conducted on children with this disorder. It was reported that in children who was diagnosed as ADHD, symptoms persisted through adolescence in 40-43% of cases (Gittelmen et al. 1985, Mannuzza et al. 1991) and through adulthood in 4-11% cases (Mannuzza 1993, Mannuzza 1998).

According to some authors, the severity of ADHD symptoms decreases by age and this disorder is not clinically important for adult psychiatry (Hill and Schoener 1996). Oppositely, there is another opinion that childhood symptoms persist in many cases, ADHD is a life long disorder and may be seen in adults as well as children (Faraone et al. 2000).

Although it has recently been accepted that ADHD can be diagnosed in adults, our knowledge about its symptoms in adulthood is limited and still controversial. There are no diagnostic criteria for adults in DSM-IV-TR (American Psychiatric Association 2001). Diagnostic criteria for ADHD are in the section of "Disorders Usually First Diagnosed In Infancy, Childhood or Adolescence" and include items like "losing toys" or "often has difficulty sustaining attention in tasks or play activities" which might be unreasonable to question in adulthood. In adults with symptoms like "inattentiveness, hyperactivity, distractibility", ADHD symptoms should be present before age 7 for a diagnosis of ADHD. However many adults with these complaints did not have a psychiatric evaluation in childhood and

as a result they need to be evaluated retrospectively. Wender-Utah Rating Scale (WURS) was developed to question childhood symptoms of ADHD retrospectively as an aid for diagnosis of ADHD in adults (Ward et al. 1993). It is based upon Utah criteria which were developed to diagnose ADHD in adults. First a 61 item five-point Likert type self assessment scale questioning ADHD symptoms in childhood was developed (Appendix 1). Twenty five items of the scale which showed the greatest difference between the normal comparison subjects and patients with ADHD are selected and scored. The total WURS score is the sum of these 25 items and range between 0-100. A cut off score of 46 or higher was reported to discriminate 86% of patients with ADHD, 99% of healthy controls and 81% of depressed subjects (Ward et al. 1993). Internal consistency and test-retest reliability after one month of both forms of WURS were reported to be high in university students (Rossini and O'Connor 1995). Factor analysis of 25-item scale revealed that three factors explained 59.4% of variance (McCann et al. 2000). In the same study 25-item WURS correctly classified 64.5% of patients seeking evaluation for ADHD. However the authors pointed out that the specificity of the scale was low and a diagnosis of ADHD with just WURS scores could be misleading.

WURS was translated and adapted into French (Bayle et al. 2003), Italian (Fossati et al. 2001), Spanish (Rodriguez-Jimenez et al. 2001) and German (Retz-Juninger et al. 2003). It is one of the most widespread used scales for diagnosing ADHD in adults. However it should always be kept in mind that it was developed to evaluate childhood symptoms of adults and it is not possible to diagnose adults according to the scale. It could give an idea about whether the patienst had symptoms of ADHD in childhood.

The aim of this study is to adapt WURS into Turkish, which would help diagnosing adult ADHD a disorder that has been drawing clinicians' attention our country too.

METHOD

Sample

ADHD group consisted of 59 patients diagnosed as ADHD according to DSM-IV criteria after comprehensive psychiatric and neuropsychological assessments in outpatient clinics of University of Ankara Medical School, Department of Psychiatry. Nineteen patients (32.2%) were females and 40 patients (67.8%) were males. Mean age was 27.3±9.3 (18-49) and mean education was 12.8±1.9 years. Eleven patients (18.6%) were diagnosed as inattentive and 48 patients (81.4%) were diagnosed as combined type ADHD.

Control group consisted of 59 patients with a diagnosis of depression and 44 patients with a diagnosis of bipolar affective disorder according to DSM-IV criteria from outpatient clinics of University of Ankara Medical School, Department of Psychiatry and who accepted participation in the study. Healthy comparison group consisted of 145 healthy volunteers and students from different faculties of University of Ankara. Subjects who were illiterate and younger than 18 years of age were excluded from the study.

In depression group, there were 23 females (44.2%) and 29 males (55.8%) whose mean age was 32.1±12.1 (18-59) and duration of education 12.5±2.5 years. In bipolar disorder group, there were 20 females (45.5%) and 24 males (54.5%) whose mean age was 36.7±10.6 (21-59) and duration of education was 12.5±2.6 years. In control group which consisted of healthy volunteers and students from various faculties of University of Ankara, there were 65 females (44.8%) and 80 males (55.2%) whose mean age was 24.2±6.2 (18-49) and duration of education was 13.2±2.3 years.

Procedure

First written permission from one of the authors who developed the scale, Prof. Paul Wender, was obtained, and then, the scale was translated into Turkish and backtranslated into English by three independent translators. Final draft was corrected by one of the authors (B.Ö.).

WURS is administered to all patients who are seeking evaluation for ADHD in University of Ankara Medical School, Department of Psychiatry. Participants in the depression and bipolar disorder groups were taken from the outpatient clinics of University of Ankara Medical School, Department of Psychiatry, all patients were in remission. The reason for this was to eliminate the possible confounding effects of these disorders on patients' ratings. Depressive patients might evaluate past events negatively or patients with a manic episode might have difficulty in cooperation.

Table 1. Demographic data of patients with ADHD, depression or bipolar disorder and healthy controls.

	ADHD (n=59)	Depression (n=52)	Bipolar Disorder (n=44)	Controls (n=145)	Total (n=300)
Gender *					
Female (%)	19 (%32.2)	23 (%44.2)	20 (%45.5)	65 (%44.8)	127 (%42.3)
Male (%)	40 (%67.8)	29 (%55.8)	24 (%54.5)	80 (%55.2)	173 (%57.7)
Mean age**	27.3±9.3 [a]	32.1±12.1 [b]	36.7±10.6 [c]	24.2±6.2 [a]	28±9.9
Duration of education (years)**	12.8±1.9	12.5±2.5	12.5±2.6	13.2±2.3	12.9±2.3

* The differences between groups were assessed by κ-square test and no significant difference between groups was present according to gender distribution

** Mean values of groups were assessed by one dimensional ANOVA analysis. Mean values for duration of education were similar. There were statistical differences between mean values for age that were represented with different letters at the level of $p < 0.05$ according to Tukey HSD test.

Control group consisted of healthy volunteers and students from different faculties of University of Ankara who accepted to participate in the study. Necessary permissions were obtained from school administrations.

In order to determine test-retest reliability of the scale, WURS was readministered to 63 of the healthy controls one month later.

Statistical Analyses

Numeric variables of demographics of the groups (ADHD, depression, bipolar affective disorder and healthy controls) were compared by one way ANOVA and chi-square test was performed for categorical variables. Cronbach's alpha, item-total score correlations and test-retest reliability after one month were calculated for reliability analyses. Factor structure of the scale was investigated by using principal components method and Varimax rotation, Cronbach's alpha value of each factor was calculated and finally, structural validity of the scale was assessed. The relation between factor scores and age was calculated by using Pearsons correlation coefficient. Mean scores of factors which seemed to be related to demographic variables were assessed by ANCOVA, by taking these as covariate. Multiple comparisons were performed by using correction of Bonferroni. Mean factor scores which were not related to demographic variables were compared by using one way ANOVA. Tukey HSD multiple comparison test was used for factors with equal group variances and Dunnet C multiple comparison test was used for factors without equal group variances. Sensitivity and specificity values for different cut-off points, positive and negative predictive values and productivity of the scale were determined.

The level of statistical significance was accepted as $p < 0.05$ for all analyses. Statistical analyses were performed by SPSS 10.0 software.

RESULTS

Analyses of Demographic Variables

Gender distribution and education in years were similar in both patient and control groups. Mean ages of ADHD group and healthy controls were similar, but patients in depression and bipolar disorder groups were significantly older than patients with ADHD and healthy controls ($p < 0.05$) (Table 1).

Validity Analyses

Factor Structure

Factor analysis using principal components method and Varimax rotation revealed five factors which explained 61.3% of variance with eigenvalues over one. These factors were named as "Irritability", "Depression", "School Problems", "Behavioral Problems / Impulsiveness" and "Inat-

Table 2. Factorial structure, suggested variance, values of factorial burden and inner consistency coefficients of factors in WURS.

	Suggested variance	Factorial burden	*Inner consistency
WURS	%61.3		0.93
Irritability	%39.5		0.88
Hot- or short-tempered, low boiling point.		0.85	
Temper outbursts, tantrums..		0.78	
Nervous, fidgety.		0.74	
Angry.		0.58	
Anxious, worrying.		0.51	
Moody, ups and downs.		0.47	
Losing control.		0.45	
Depression	%6.5		0.78
Guilty feelings		0.69	
Tendency to be immature.		0.63	
Irritable.		0.63	
Low opinion of myself.		0.60	
Sad or blue, depressed, unhappy..		0.39	
School problems	%5.6		0.57
Overall a poor student, slow learner.		0.78	
Trouble with mathematics or numbers.		0.58	
Unpopular with other children, didn't keep friends for long, didn't get along with other children.		0.57	
Behavioural problems / Impulsiveness	%5.4		0.79
Trouble with authorities, trouble with school, visits principal's office.		0.82	
Disobedient with parents, rebellious, sassy.		0.57	
Tendency to be or act irrational		0.52	
Acting without thinking, impulsive.		0.45	
Trouble seeing things from someone alse's point of view.		0.45	
Attention deficit	%4.3		0.80
Stubborn, strongwilled.		-0.74	
Trouble with stick-to-it-tiveness, not following through, failing to finish things started.		0.62	
Inattentive, daydreaming.		0.57	
Concentration problems, easily distracted.		0.54	
Not achieveing up to my potential.		0.41	

* Cronbach's alpha

tentiveness" respectively (Table 2). Scores of the item "Stubborn, strong-willed " was reversed because of its negative factor loading.

Group Comparisons

Mean scores for the subscales and scales of patients with ADHD, depression, bipolar disorder and control groups were presented in Table 3.

As mean ages of groups were different, the relationship between factor scores and age was investigated and "School Problems" factor (Factor

Table 3. Mean scores of groups for WURS and its subscales*.

	ADHD	Depression	Bipoalr Disorder	Controls
Irritability	2.0±0.9 [a]	1.4±1.0 [b]	1.2±1.1 [b]	0.8±0.7 [b]
Depression	1.6±0.9 [a]	1.3±0.9 [a]	1.2±1.0 [a b]	0.9±0.7 [b]
School Problems**	1.3±1.1 [a]	0.7±0.6 [b]	0.8±0.8 [b]	0.4±0.5 [b]
Behavioural Problems/ Impulsiveness	1.8±0.9 [a]	0.8±0.8 [b]	0.9±0.9 [b]	0.6±0.6 [b]
Inattentiveness	2.9±0.8 [a]	1.5±0.8 [b]	1.3±0.9 [b]	0.9±0.6 [c]
Total WURS points	49.2±17.5 [a]	27.7±19.2 [b]	29.3±17 [b]	18.5±11.7 [c]

* Mean scores of groups were compared by one way ANOVA.
** ANCOVA analysis with age taken as covariate was performed. Multiple comparisons were performed by Bonferroni correction.
[abc] The mean scores that do not share the same superscript on the rows are significantly different from each other as revealed by Dunnet C test ($p<0.05$).

3) was found to be correlated weakly, but significantly with age ($r=.13$, $p < 0.05$). Scores of other factors and whole scale had no correlation with age.

While comparing the mean factor scores of patient and control groups, we found that group variances were unequal (Levene test) and multiple comparisons between groups were performed by using Dunnet C test. Because "School Problems" factor score was correlated with age, age was taken as a covariate while analyzing this factor. Mean scores were significantly higher in ADHD group than other groups in all subscales other than "Depression" subscale ($p < 0.05$) (Table 3).

Mean scores of WURS were similar in females (28±21.3) and males (27.7±16.6).

When cut-off point was taken as 36 or more, 82.5% of adults with ADHD (sensitivity), 90.8% of controls (specificity), 66.7% of depressives and 64.3% of patients with bipolar disorder could be classified correctly (Table 4). Positive and negative predictive values and productivity for this point were 0.52, 0.95 and 0.81, respectively.

Reliability Analyses

For internal consistency analysis of WURS and its subscales Cronbach's alpha coefficients were calculated as follows; Irritability-0.88, Depression-0.78, School Problems-0.57, Behavioral Problems / Impulsiveness-0.79, Inattentiveness-0.80 and whole scale-0.93 (Table 2). Correlations between items of each factor and total factor scores (item-total score correlations) were between 0.60-0.75 for Irritability, 0.43-0.61 for Depression, 0.32-0.49 for School Problems, 0.49-0.67 for Behavioral Problems / Impulsiveness and 0.31-0.72 for Inattentiveness.

One month test-retest reliability was found to be 0.81 for WURS ($p < 0.001$).

DISCUSSION

In this study we investigated validity and reliability of Turkish version of WURS which was developed to help diagnosing ADHD in adults and included many questions about childhood symptoms of ADHD.

Original WURS has 61 items and includes many items about childhood and even medical problems as a child. In the original study of Ward and colleagues they have selected 25 items of this scale that are discriminating patients with ADHD from healthy controls best and determined the cut-off point (1993), howeever they did not perform a factor analysis because of relatively smaller size of sampling. This was performed by McCann and colleagues with a different sample and three factors named as "Dysthymia", "Oppositional / Defiant Behavior" and "School Problems" were determined (2000). As a result of our factor analysis, we obtained five factors as "Irritability", "Depression", "School Problems", "Behavioral Problems / Impulsiveness" and "Inattentiveness" that explained 61.3% of the total variance. As a difference from development study of the scale, we reversed one item while calculating the total score

Table 4. Percentage of patients who were correctly classified by WURS as ADHD (sensitivity) and as depression, bipolar disorder and control groups (specificity) for various cut off scores,, positive and negative predictive values and productivity

Cut-off point	33	34	35	36	37
ADHD	86	84.2	84.2	82.5	77.2
Control group					
Depression	59.6	61.7	63.7	66	77.2
Bipolar Disorder	59.5	59.5	61.9	64.3	66
Healthy volunteers	89.4	90.1	90.1	90.8	66.7
Total	77.8	78.7	79.6	80.9	90.8
Pozitive predictive value	0.49	0.49	0.51	0.52	0.51
Negative predictive value	0.96	0.95	0.95	0.95	0.94
Productivity	0.79	0.80	0.80	0.81	0.80

because of its negative factor loading .As mean ages of groups were different, a possible relationship between factor scores and age was investigated, "School Problems" factor was found to be weakly, but significantly correlated with age. The reason for this might be the retrospective evaluation, however we think this is not very much likely because there is no such correlation for other factors and total points. Correlation with age might be a result of the changes in education system in time. The study of Ward and colleagues (1993) and Italian adaptation (Fossati et al. 2001) did not reveal any correlation between total scores of scale and age.

In this study, total WURS scores of both genders were similar. But Fossati and colleagues found that total WURS points of males were higher in healthy college students (2001). However they reported that there was not such a difference in psychiatric patients. The authors suggested that this difference was due to higher prevalence of ADHD in non-clinical males.

As mean factor scores other than "Depression" and total WURS scores of ADHD group was different from comparison groups,we concluded that WURS was able to distinguish ADHD group from healthy controls, patients with depression and with bipolar disorder.

Reliability of WURS and its subscales was determined by analysis of internal consistency and Cronbach's alpha coefficients were found to be high for whole scale and at a moderate level for the subscales. The lowest item-total score correlation was 0.31 and we concluded that item distinguishing index was satisfactory. Moreover, test-retest reliability was at a desirable level.

Sensitivity and specificity of WURS for various cut-off scores indicates that WURS could successfully distinguish ADHD group from healthy controls, however this was not the case for depression and bipolar disorder groups.

The difference in distinguishing ADHD group from healthy controls and patients with depressive or bipolar disorders could be due to various reasons. Recent literature points out the comorbidity of ADHD and bipolar disorder (Wiens et al. 2003). Prevalence of ADHD was reported to be high in children with bipolar disorder (Geller et al. 2000) and early onset bipolar disorder was related to ADHD (Sachs et al. 2000). Also, similarities of some symptoms of ADHD and bipolar disorder might explain the relatively low distinguishing power.

Another reason which lowered the specificity of the scale might be the inclusion of several depression symptoms in the 25-item form of WURS. In fact, factor analysis revealed that items like "guilty feelings, regretful", "low opinion of myself " or "sad or blue, depressed, unhappy" were loaded to "Depression" factor "". Comorbidity of ADHD and depression is reported to be high

(Mick et al. 2003) and moreover in adolescents, ADHD, depression, oppositional/defiant disorder and conduct disorder are suggested to be considered a cluster and if one of these disorders was present, others should be questioned to (Volk et al. 2005). In the study of Ward and colleagues which they developed WURS, patients with atypical depression were reported to receive higher points from the scale (1993). Apart from depression and bipolar disorder, WURS is possibly inadequate to differentiate patients with anxiety disorders from patients with ADHD. Moreover the authors concluded that the scale might require a considerable revision for use in clinical populations (Mancini et al. 1999).

After examining sensitivity and specificity of WURS for various cut-off scores , a cut off score of 36 and over was determined as cut-off point. This is considerably lower than the cut off score 46 which was reported by Ward and colleagues (1993). One of the reasons for this lower level might be the reverse grading of one item. Similar to this Turkish study, cut-off scores were reported to be 32 for Spanish (Rodriguez-Jimenez et al. 2001) and 30 for German (Retz-Junginger et al. 2003) versions. Differences between study groups as well as socio-cultural or methodological differences might be the reason for the different cut off scores. In fact, in a study that Turkish and Canadian parents assessed their children with ADHD, a cultural difference was present in evaluation of ADHD symptoms (Erman et al. 2000).

There were some limitations of our study. ADHD group was younger than depression and bipolar disorder groups. No other scale was used in order to investigate synchronous validity. As mean ages of groups were different, during analyses age was taken as covariate. Due to lack of scalesdeveloped for diagnosing ADHD in adults, comparison with any other scale was impossible. Education in years was high in whole sample and as a result our results might not be generalized.

Turkish form of WURS is a reliable and valid scale for assessing childhood symptoms of ADHD in adults. However, when diagnosing ADHD, other psychiatric disorders like depression, bipolar disorder and anxiety disorders which could share common symptoms should considered besides the scale score. In future, studies consideringcultural differences could identify items which distinguish adults with ADHD from other groups best in Turkish culture.

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