

Research Article

The Rapid Interactive Screening Test for Autism in Toddlers (RITA-T): Validity in a Lebanese Cross-Cultural Pilot Study

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Abstract

Objective is cross-culturally validating the Rapid Interactive Screening Test for Autism in Toddlers (RITA-T). Validity, specificity, sensitivity and cut off score were established in typically developing/at-risk, Autism Spectrum Disorders (ASD) negative/at-risk and ASD positive Lebanese toddlers aged 18-36 months. RITA-T/Modified Checklist for Autism in Toddlers-Revised (M-CHAT-R) tests preceded diagnosis by clinical evaluation, Autism Diagnostic Observation Schedule/Diagnostic and Statistical Manual of Mental Disorders, 5th Edition (DSM-5) criteria. RITA-T demonstrates good internal consistency/test-retest reliability. Scores for RITA-T /M-CHAT-R were higher in at-risk-ASD vs. typically developing/at-risk non-ASD toddlers. Significant correlations between RITA-T and ADOS-2 scores suggested convergent validity. Receiver operating curve analysis identified 15 as cut-off for ASD (sensitivity=96%/specificity=100%) with positive/negative predictive values of 100% and 96%, respectively. The RITA-T is effective in screening ASD in Lebanese toddlers.

Keywords: Autism spectrum disorders; Communication disorders; Diagnosis; Early intervention; Toddlers; Lebanon

Abbreviations: ASD: Autism Spectrum Disorders; DSM 5: Diagnostic Statistical Manual Fifth Edition; AAP: American Academy of Pediatrics; APA: American Psychiatric Association; MCHAT-R: Modified Checklist for Autism in Toddlers Revised; AUBMC: American University of Beirut Medical Center; IRB: Institutional Review Board; RITA-T: Rapid Interactive Screening Test for Autism in Toddlers; ADOS-2: Autism Diagnostic Observational Schedule- Second Edition; ASKC: American University of Beirut Special Kids Clinic; CSBS: Communication and Symbolic Behavior Scale; SORF: Systematic Observation for Red Flags; PPV: Positive Predictive Value; NPV: Negative Predictive Value; AUC: Area Under the Curve; ICC: Intra Class Correlations; SD: Standard Deviation

Introduction

Autism Spectrum Disorder (ASD) describes a neurodevelopmental disorder that ranges from mild to severe, affecting two behavioral domains: social communication skills and repetitive and stereotyped behaviors [1]. Despite an unknown specific etiology, many studies link ASD to a genetic basis [2]. Other studies discuss the role of environmental risk factors [3] and neurochemical contributions to the pathophysiology of ASD [4,5]. In Lebanon, the prevalence of ASD is 1 in 68 children [6] similar to the prevalence of the United States of America (USA) in 2012 [7]. A new estimate published by the Center for Disease Control and Prevention (CDC) reveals a prevalence of 1 in 54 children in the USA showing an increase over time [8].

Symptoms of ASD can be present clinically starting at six months of age and sometimes earlier: the infant tends to be quiet, does not engage in reciprocal and social games, with delay and absence of a social smile [9]. Symptoms become more obvious later [10]. We can diagnose ASD earlier and this has changed over recent years [11,12]. Several studies report the risk for ASD is detectable before the child turns three years old [13]. The average age of diagnosis for ASD in the United States of America is 4 years 2 months [14]. Early detection, before the age of three, results in vital access to early intervention services and improves the quality of life of patients and their families [15,16]. For this reason, researchers have developed a two-tiered screening approach for ASD to insure accurate diagnosis [17]. By using a two-tiered approach, toddlers who score positive on a level one screening tool then undergo a second level two screening. This approach has increased the number of children eligible for intervention and decreased waiting time for undergoing a full diagnostic evaluation [18]. Level one tools are generally used in primary care settings and rely on parent interviews or questionnaires [19]. One of the frequently used level one screeners is the Modified Checklist for Autism in Toddlers-Revised (M-CHAT-R) [20]. Using the M-CHAT-R alone, however, results in a high number of false positives resulting in over-referrals for full evaluations. It has a Positive Predictive Value (PPV) of 0.509 with follow-up [21]. A level two screener is required after a positive level one for definitive diagnosis confirming the risk for ASD [17].

There are several tools for level two screenings, but most cannot be administered to children under the age of two years [19]. The Systematic Observation for Red Flags (SORF) is one of the tools administered to 16-24 month-old toddlers, but cannot be administered alone. It must be preceded by the Communication and Symbolic Behavior Scale (CSBS) and a video recording to code the test [22]. Another tool is the Autism Diagnostic Observational Schedule-Second Edition (ADOS-2) [23]. It is a semi-structured standardized tool used as the gold standard to diagnose ASD. The ADOS-2 toddler module is designed for children aged 12 to 30 months and provides ranges of concerns reflecting the extent to which a child demonstrates behaviors associated with ASD. It, however, requires 40-60 minutes to administer [24].

A brief observational screening measure called the Rapid Interactive Screening Test for Autism Spectrum Disorders in Toddlers (RITA-T) was developed and had promising initial results in identifying high risk toddlers for ASD [25]. The RITA-T is a level two screening tool and can be administered to toddlers aged 18-36 months following a positive level one screener. It differentiates between ASD and other developmental delays. It consists of nine interactive tasks evaluating early signs of ASD and can be administered and scored in 5-10 minutes [26]. A recent study performed in Calgary confirmed that implementing the RITA-T for screening of children aged 12 to 36 months results in an efficient

diagnostic protocol in a shorter period of evaluation [27].

The RITA-T is proposed as a level-2 screening tool for autism in toddlers and studies show that it correlates positively with The Autism Diagnostic Observation Schedule-Generic (ADOS-G) - an older version of ADOS-2 - and DSM-5 criteria [25]. In an initial validation study carried out in 2015, the RITA-T showed high sensitivity (1) and specificity (0.88), a positive predictive value (PPV) of 0.89 and a negative predictive value (NPV) of 1 in screening for autism spectrum disorders. A cut-off score of 14 differentiated between ASD and typically developing toddlers [25]. A further study in a large cohort of toddlers showed that cut-off scores below 12 are associated with non ASD risk, 12-16 being a “grey area” and scores above 16 to be associated with a high risk of ASD [27].

The purpose of this study is to cross-culturally validate the RITA-T and establish reliability, specificity, sensitivity, and identify cut-off scores as a level-two screener for ASD in the Lebanese population. The assumption is that the RITA-T will be a valid and reliable level two tool to screen toddlers at-risk for ASD in Lebanon.

Methods

Study Measurements

Assessment measures included the M-CHAT-R, ADOS-2, and the RITA-T. M-CHAT-R is a level one parent report screening tool for toddlers between 16 and 30 months of age. The checklist consists of 20 questions answered by parents. A total score between 0 and 2 indicates low risk, 3-7 moderate risk, and 8-20 high risk for ASD [20]. A translated Arabic version published on the official M-CHAT website was used in this study [20]. For Lebanese parents who cannot read Arabic, the original English version developed by Robins, Fein and Barton in 2009 was used. ADOS-2 is a standardized diagnostic tool for ASD used from the age of 12 months through adulthood [23]. It allows accurate diagnosis of ASD across ages, developmental levels, and language skills. It consists of five modules: a toddler module that provides ranges of concerns reflecting the extent to which a child demonstrates behaviors associated with ASD. Modules 1 through 4 provide cut-off scores for autism and autism spectrum classifications. Modules used in this research are the toddler module and module 1. After the observation testing was scored, the overall total was compared to the ranges of concern or to the overall total cut-off scores of the module one algorithm [23]. The RITA-T is an interactive level two screening test for toddlers aged 18-36 months [25] and is administered after a positive level one screener or if there are concerns in at-risk population. It consists of nine interactive activities that evaluate five developmental constructs considered early signs for ASD. These include joint attention, social awareness, awareness of human agency, self-recognition, and fundamental cognitive skills.

Each activity is coded and then scored based on the child's response. The lower the score, the more typical the response. The score can vary from 0 to 30 with 30 being the maximum score. The cut-off score for an ASD diagnosis was 14 [25]. A subsequent paper found that a cut-off score less than 12 to be low risk; a score of 12-16 to be needing further evaluation or "grey area" and a score greater than 16 to be consistently associated with ASD [27].

Translation Process

Permission was sought from the author to translate the original RITA-T scoring sheet into Arabic. The translation process followed the five stages proposed by Beaton et al. [28]. Stage 1: Initial translation of RITA-T by two professionals with different backgrounds was executed by two independent blinded forward translations from English to Arabic: a speech and language pathologist, and a professional sworn translator. Both translators are bilingual with Arabic as their native language. Stage 2: Synthesis of the translations: A recording observer who is a speech and language pathologist synthesized the two translations with the two translators. The synthesis was carried out with consensus from all. An Arabic version combining the two translations was generated.

Stage 3: Back translation: to check if the translated version of the RITA-T reflected the same content, two blind translators of the original English version translated the scoring sheet from Arabic to English. The two translators were bilingual, with English as their mother tongue without any medical background. Stage 4: Expert committee: A committee consisting of three speech and language pathologists, two occupational therapists, a psychologist, a medical doctor and a linguist reviewed all versions and developed a final version for field-testing. Semantic, idiomatic, experiential, and conceptual equivalences were examined and a consensus on wording of items was reached. Step 5: Pre-test: The preliminary final version was administered to a sample of 10 Lebanese toddlers by two bilingual SLPs and a BCBA trained to administer the RITA-T.

Study Participants

A pilot study was carried out over a 16-month period extending from June 2018 to October 2019. Typically developing toddlers and toddlers at-risk for ASD aged 18 to 36 months participated in the study.

All toddlers with genetic disorders, known birth defects, or acute illnesses were excluded from the study. A total of 48 toddlers aged 18 to 36 months were recruited into different experimental groups: A control group that included 19 typically developing toddlers from the General Pediatrics outpatient clinics at AUBMC without developmental concerns, 29 toddlers were recruited as at-risk referred by pediatric neurologists from AUBMC. This second group was divided into an at-risk, ASD-positive group (n=22)

and an at-risk, ASD-negative group (n=7) based on the results of M-CHAT-R, ADOS-2, and clinical impression of the pediatric neurologist combined together. Approvals from the author and the Institutional Review Board (IRB) at the American University of Beirut (AUB) were sought prior to the study.

Procedures

Typically developing toddlers were invited to participate using an AUB IRB approved flyer that was posted in the Pediatric Clinics at the American University of Beirut Medical Center (AUBMC). An email was sent to pediatric neurologists and pediatricians at AUBMC informing them about the study and to enroll toddlers and toddlers at-risk for ASD to participate in this study. A two-step approach was employed to recruit patients. Pediatric neurologists and pediatricians at AUBMC approached parents or legal guardians to inform them about the study. If interested in participation, they were asked to provide written consent before collection of data. After consenting, they filled the M-CHAT-R followed by administration of the RITA-T by the researcher who completed the online training. Written consent enabled the researcher to later extract information from medical charts regarding gender of the child, ADOS-2 scores, diagnostic impression of the pediatrician, and the child's date of birth. For the typically developing toddler group, parents completed the M-CHAT-R and the researcher administered the RITA-T. All at-risk toddlers at AUBMC were assessed by one of three pediatric neurologists who raised an initial concern of ASD, based on DSM-5 criteria. Pediatric neurologists referred those for ADOS-2 testing as part of routine procedure to rule out ASD at the AUBMC Special Kids Clinic. A Speech and Language Pathologist (SLP), and a clinical psychologist/Board Certified Behavioral Analyst (BCBA) administered the ADOS-2. Both were trained and certified to administer the ADOS-2. On the same day of the visit for ADOS-2 testing, consent was obtained from parents and they were asked to complete the M-CHAT-R. After that, the RITA-T was administered. The researcher was blinded to results of the ADOS-2. The RITA-T was administered right after ADOS-2, before availability of ADOS-2 scores or discussion with parents. M-CHAT-R and ADOS-2 results were reported to the pediatric neurologist to inform his/her diagnostic decision of at-risk and ASD positive or at-risk but ASD negative. In order to assess test-retest and inter-rater reliability of the RITA-T, 10 toddlers were randomly selected. Each participating toddler and their parent(s) attended two sessions conducted two weeks apart, during which the RITA-T was administered. The same rater evaluated each toddler during the two sessions.

Statistical Analysis

Descriptive statistics were reported using means and Standard Deviations (SD) for continuous variables and frequencies with percentages for categorical variables. Baseline demographic char-

acteristics were compared across the three study groups of “typically developing”, “at-risk but ASD negative”, and “at-risk and ASD positive” toddlers by the analysis of variance (ANOVA) test or the Kruskal–Wallis test, as appropriate. Fisher’s exact test was conducted to compare gender distribution across the three study groups. Test-retest reliability was determined using the Spearman’s rank correlation coefficient. Inter-rater reliability was evaluated by examining the RITA-T scores that were measured by two raters independently and calculating the correlation coefficient between the two sets of the scores using Intraclass Correlation (ICC). **Internal consistency reliability** was assessed using Cronbach’s alpha coefficient. **External nomological validity** was examined by correlating the scores of the RITA-T and ADOS-2 scores and evaluating the association of the RITA-T scale with chronological age (using Spearman’s rho) and gender (using Mann Whitney U-test). **Criterion-related validity** of RITA-T using the “combined DSM-5 and ADOS-2 diagnoses” as reference/gold standard was assessed by performing a Receiver Operating Characteristic (ROC) curve that plotted the sensitivity and specificity for each of the cut-off points, and the area under the ROC Curve (AUC). Youden Index [defined as $J = \max(\text{sensitivity} + \text{specificity} - 1)$] was calculated to determine the optimal cut-off point. Positive and Negative Predictive Values (PPV/NPV) of the optimal cut-off point were also calculated. All analyses were undertaken using IBM SPSS Statistics 25.0. All statistical tests were two-sided, and the significant level was set at 0.05.

Results

Baseline Characteristics of the Study Participants

A total of 48 toddlers were recruited for this study and included 32 males and 16 females. The mean age was 27.52 ± 5 months. The mean scores of RITA-T, M-CHAT-R total items failed, in the total sample of participating toddlers were $12.64 (\pm 7.05)$ and $3.68 (\pm 4.26)$, respectively. Twenty-nine toddlers received an at-risk diagnosis by pediatric neurologists according to DSM-5 criteria, of which twenty-two toddlers were confirmed as ASD cases following ADOS-2 assessment. On average, at-risk toddlers were slightly older than typically developing toddlers, but this difference was not statistically significant [$26.95 (\pm 4.98)$ for typically developing, $30.29 (\pm 5.18)$ for at-risk but ASD negative, and $27.14 (\pm 4.90)$ for at-risk and ASD positive, $P=0.290$]. Proportions of males and females were not evenly distributed among the three groups with males being more concentrated in the at-risk, ASD positive toddlers at 59.4% versus typically developing at 28.1% and at-risk, ASD negative toddlers at 12.5% ($P=0.024$). The mean total score of the RITA-T was significantly higher in the at-risk and ASD positive vs. the at-risk but ASD negative and typically developing toddlers [$19.45 (\pm 3.58)$ vs. $8.71 (\pm 3.54)$, $6.21 (\pm 2.09)$, $P<0.001$]. M-CHAT-R mean total items were higher in the at-risk, ASD positive vs. typically developing and at-risk but ASD negative toddlers (Table 1).

	Total sample (N=48)	Typically developing (n=19)	At-risk but ASD negative (n=7)	At-risk and ASD positive (n=22)	p-value
Gender n (%)					
Males	32 (66.7)	9 (28.1)	4 (12.5)	19 (59.4)	0.024 ^{a*}
Females	16 (33.3)	10 (62.5)	3 (18.8)	3 (18.8)	
Age in months, mean (\pm SD)	27.52 (\pm 5.00)	26.95 (\pm 4.98)	30.29 (\pm 5.18)	27.14 (\pm 4.90)	0.290 ^b
Test scores, mean (\pmSD)					
RITA-T, total score	12.64 (\pm 7.05)	6.21 (\pm 2.09)	8.71 (\pm 3.54)	19.45 (\pm 3.58)	<0.001 ^{b*}
M-CHAT-R, total items failed	3.68 (\pm 4.26)	0.42 (\pm 0.60)	1.42 (\pm 1.27)	7.22 (\pm 3.93)	<0.001 ^{b*}

Table 1: Characteristics of participating toddlers by experimental groups.

Test-retest reliability and internal consistency of the finalized Arabic version

The 27 items of the final Arabic RITA-T test showed high/good internal consistency (Cronbach’s $\alpha = 0.91$), high test-retest reliability (Spearman’s rho coefficient 0.85; $p<0.05$), and a good inter-rater reliability [ICC=0.996; 95% CI (0.974-0.999); $p<0.001$].

External nomological validity, relationships of RITA-T with other measures and demographics

In the subsample of at-risk toddlers, the RITA-T and ADOS-2 total scores were positively correlated [$r=0.698$; $n=29$; $p<0.001$] (Figure 1). Mean RITA-T scores were significantly higher among those who were ADOS-2 positive vs. ADOS-2 negative [$19.45 (\pm 3.58)$ vs. $8.71 (\pm 3.54)$, $p<0.001$]. Males scored statistically higher RITA-T scores than females and this was significant [$14.5 (\pm 6.69)$ vs. $8.81 (\pm 6.31)$, $p<0.05$]. No statistically significant correlation was established between RITA-T total score and age in the entire sample of toddlers.

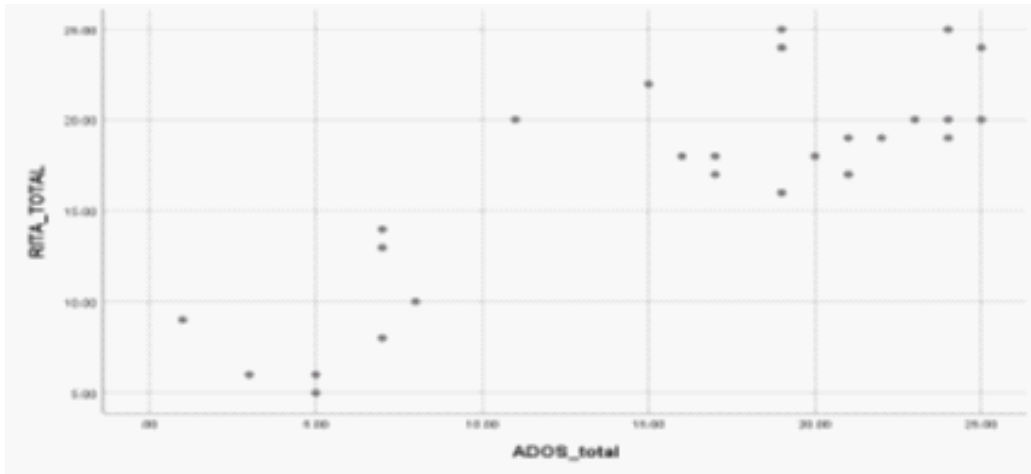


Figure 1: Correlation between RITA-T and ADOS-2 scores. The RITA-T and ADOS-2 total scores were positively correlated [$r=0.698$; $n=29$; $p<0.001$].

Criterion Validity and Properties of RITA-T for the Study Sample

Discriminant validity of the RITA-T test was evaluated through its ability to differentiate between ASD and non-ASD. The receiver-operating characteristic (ROC) curve was applied by using the “combined DSM-5 and ADOS-2 diagnoses” as the ‘gold standard’. The AUC of the RITA-T was 0.997 indicating a very good discriminant ability (Figure 2).

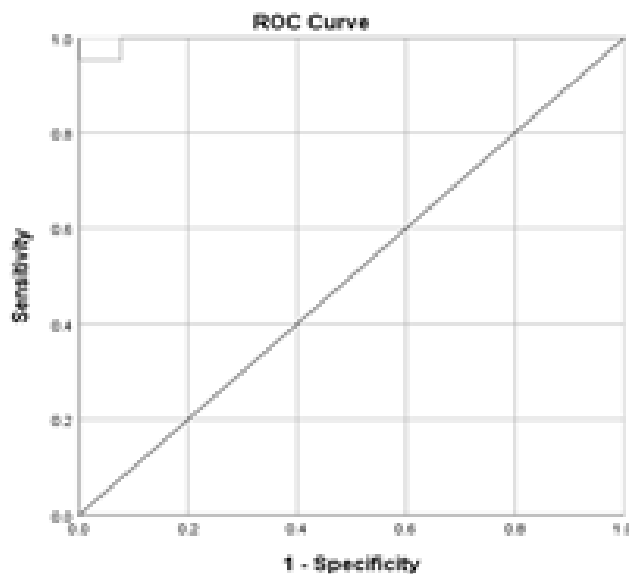


Figure 2: Receiver Operating Curve for ASD diagnosis using RITA-T-scores. The area under the curve (AUC) of the ROC was quantified using the “combined DSM-5 and ADOS-2 diagnoses” as the ‘gold standard’. The AUC of the RITA-T was 0.997.

The ROC curve of RITA-T produced several cut-off points of the RITA-T (Table 2). In this sample, a cut-off of 15 or a score equal to or greater than 15 provided the best combination of sensitivity (96%) and specificity (100%). At this cut-off, tabulation of false positive, false negative, true positive and true negative diagnoses, delivered a PPV 100% and an NPV of 96% (Table 3). Using a cut-off 15 for the RITA-T, pediatricians may conclude that in toddlers who score less than 15, the probability of ruling out ASD is 96% while in those who score 15 or above the probability of having ASD is 100%.

Positive if Greater Than or Equal To ^a	Sensitivity	Specificity	Youden index
1.0000	1.000	0.000	0.000
2.5000	1.000	0.038	0.038
3.5000	1.000	0.115	0.115
4.5000	1.000	0.154	0.154
5.5000	1.000	0.308	0.308
6.5000	1.000	0.423	0.423
7.5000	1.000	0.615	0.615
8.5000	1.000	0.808	0.808
9.5000	1.000	0.923	0.923
11.5000	0.955	0.923	0.878
13.5000	0.955	0.962	0.916
15.0000	0.955	1.000	0.955
16.5000	0.864	1.000	0.864
17.5000	0.727	1.000	0.727
18.5000	0.591	1.000	0.591
19.5000	0.455	1.000	0.455
21.0000	0.273	1.000	0.273
23.0000	0.227	1.000	0.227
24.5000	0.091	1.000	0.091
26.0000	0.000	1.000	0.000

^aThe smallest cut-off value is the minimum observed test value minus 1, and the largest cut-off value is the maximum observed test value plus 1. All the other cut-off values are the averages of two consecutive ordered observed test values.

Table 2: Sensitivity and specificity of the RITA-T at different cut-off scores based on the combined DSM-5 and ADOS-2 diagnoses in the total sample.

		DIAGNOSIS		Total
		Non-ASD	ASD	
RITA-T (cut-off 15)	Negative	26	1	27
	Positive	0	21	21
Total		26	22	48

PPV= Total true positive/Total test positive *100 = 21/21*100=100%

NPV= Total true negative/Total test negative *100=26/27*100=96.3%

Table 3: RITA-T cut-off of 15 and diagnosis cross-tabulations.

Discussion

The importance of early detection of autism spectrum disorders has been discussed in several replicated studies [29,17,12]. Filipek suggested a two-tiered approach to diagnose ASD. Tier one is a routine developmental screening during a child's visit to the pediatrician, and tier two is the diagnosis and evaluation after a positive result in tier one [30]. The current available tier one screeners are few. Using tier one screeners alone will lead to over-referrals [31,20]. It is, therefore, essential to use it together with tier two screeners. The RITA-T is a new tier two screening tool developed by one of the authors in the USA [25]. Effective tier two screening tools are not available for most practitioners in Lebanon outside a tertiary clinical center. To date, no studies validated tier two screening tools for autism in toddlers in Lebanon and Arab countries. This underscores the importance of establishing evidence for cross-cultural validity of the RITA-T in a sample of Lebanese toddlers. In this study, reliability, validity, specificity and sensitivity of the translated version of the RITA-T were evaluated. The RITA-T screening tool was successfully validated in a sample of Lebanese toddlers. It demonstrated good capacity to differentiate toddlers with ASD from those without ASD. The RITA-T scores were significantly higher in ASD vs. non-ASD toddlers (mean score, 19.45 vs. 8.71). In her initial validation study, Choueiri reported similar findings where RITA-T scores were significantly higher in the ASD experimental group than in the non-ASD group with a mean score, 20.8 vs 13 [25]. These results were replicated further in a larger study where mean RITA-T scores in ASD vs non-ASD were 22.1 vs 12.1 respectively [27].

Another significant finding was that the RITA-T and ADOS-2 total scores were positively correlated ($r=0.698$; $n=29$; $p<0.001$) and mean RITA-T scores were significantly higher in ADOS-2 positive vs. ADOS-2 negative toddlers [19.45 (± 3.58) vs. 8.71 (± 3.54), $p<0.001$] respectively. Choueiri reported similar results with RITA-T being positively correlated with ADOS-G in a sample number of 25 toddlers ($r=0.79$; $n=25$; $p<0.001$) [25]. In this sample, a cut-off of 15 or a score equal to or greater than 15 provided the best combination of sensitivity (95.5%) and specificity (100%), which replicates previous findings [26]. At a cut-off score of greater than 14, the RITA-T had a sensitivity of 100%, and a specificity of 84%. Another study reported a cut-off score of 14 has the best predictor of sensitivity 97% and specificity 71% [27]. In a sample of 48 toddlers, the RITA-T resulted in one false negative case which was a 30-month-old toddler who scored 13 on the RITA-T, 0 on the M-CHAT-R and 8 on the ADOS-2 toddler module corresponding to mild to moderate concerns. The results of this toddler matches with Lemay and Choueiri's recent classification of scores by risk groups since this false negative case falls in the moderate risk group that needs further in-depth evaluations [27]. Furthermore, this study provides evidence for convergent validity of the RITA-T total scale and significant

association with ADOS-2 considered as the "gold standard" for ASD diagnostic tools. The RITA-T also showed high internal consistency as shown by Cronbach's alpha ($\alpha = 0.91$).

In this study, two independent clinicians administered tests for the same toddler improving reliability and decreasing rater bias. Another strength of this study was use of the clinical judgement of pediatric neurologists for an initial diagnosis of non-ASD and at-risk for ASD, prior to administration of standardized tools to confirm the diagnosis. Consequently, researchers relied on a combination of clinical suspicion, M-CHAT-R and ADOS-2 scores to come up with a final diagnosis of ASD. In addition, it is important to note that males and females were not evenly distributed in the sample with males being concentrated in at-risk toddlers two-fold more than in typically developing toddlers (71.9% vs. 28.1%, $P=0.024$). This difference is explained by the higher ratio of ASD prevalence in males vs. females in the USA [32,33] and even Lebanon, though less than in the west [6]. In another explanation, recent studies have shown that females are referred and identified with ASD at a later age than boys [34,35]. Finally, the RITA-T demonstrated strong reproducibility in toddlers with re-testing with an intra-class coefficient of 0.996. These results provide strong evidence to support the fact that the RITA-T is a valid and reliable screening tool for autism in Lebanese toddlers aged 18 to 36 months and its integration in primary care can identify and accelerate referrals for diagnostic evaluation.

Limitations

A main limitation was the small sample size. A recent published study had a large sample size [27]; however, most of the previously published studies of screening tools for toddlers had small sample size, [26,36,37] further studies of a larger sample of Lebanese toddlers are warranted, producing results with greater precision and power. Another limitation was the time required for data collection and recruitment of at-risk toddlers. Despite the fact that there is a decrease in age at diagnosis of ASD, many children are still identified at an age greater than 36 months due to lack of resources, physician awareness and low rates of sub-specialty referrals [38,39]. A third limitation to this study was the small number of publications on the RITA-T which limited researcher ability to compare results with previous data.

Conclusion

Early identification of autism spectrum disorders is crucial and will help in referring toddlers to early intervention services as early as possible. This in turn improves outcomes and quality of life. Several studies prove that structured behavioral approaches help improve language and communication skills in children with ASD [40]. These were the reasons behind validating the RITA-T in a clinical setting in Lebanon. It becomes important to introduce the RITA-T to Lebanese health professionals and clinicians as

well as those in the Arab world in the future to lower the age of identification of ASD, so that referrals for early intervention services occur as soon as possible. One must take into account the high financial cost of available tools and time required to administer them. The RITA-T requires 10 minutes of administration and scoring making it an ideal option based on financial and time constraints. It is suitable for medical centers with large workloads, as well as busy clinicians in private settings and in inner city and rural communities.

The RITA-T is a new tool, and it is recommended to assess its validity, reliability, specificity and sensitivity in a sample size across all Lebanese governorates and to conduct studies generating normative data for the RITA-T in a larger sample.

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