The effect of age on the degree of improvement of pragmatics in delayed language developed children

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Background

The study of actual language use is called "pragmatics." The literal meaning of an utterance is necessary, but not sufficient for the partner to reconstruct the meaning conveyed by the actor. The interventions of pragmatic impairments depend mainly on improving the four important aspects for any effective social communication contexts that are social interactions, social cognition, language processing, and pragmatic skills.

Aim

The paper aims to study the effect of age on pragmatic intervention to decide what age is more appropriate to give the better response of pragmatic impaired children.

Patients and methods

This study was conducted on 20 children with pragmatic impairments attending the Unit of Phoniatrics, in the outpatient clinic of Alexandria Main University Hospital. The children of the study were divided into two groups: group A: 10 children with pragmatic skill impairments aged (5–<6.5) years old and group B: 10 children with pragmatic skills impairments aged (6.5–8) years old. First, Initial assessment: (A) elementary diagnostic procedures: history taking, general examination. (B) Clinical diagnostic aids: psychometric evaluation, Arabic language test, and pragmatic language skills evaluation by using the Arabic version of Test of Pragmatic Language second edition, which is a subtest of Comprehensive Arabic language test. Second, Intervention: the program was applied to all children in groups of 2–3 children, one session per week, each session ranging from 45 to 60 min. Two types of interventions were applied which were: (a) direct intervention: typically delivered by speech-language pathologist and (b) indirect interventions: typically consisted of advices and instructions to the parents or to support the generalization of social communication skills in the child's environment. "Say and Do Positive Pragmatic Fun Sheets" program helps children learn to use appropriate social communication skills in everyday situations. The fun sheets target a variety of social communication skills in the following areas: giving information, persuasion, requesting, problem solving, feelings, appropriate interaction, greetings/politeness, and topic maintenance. The duration of therapy was about 3–6 months. Third, Reevaluation: after a period of 3–6 months of therapy using the protocol of initial assessment.

Results

A statistically highly significant increase in the scores of the cases of the school-age studied groups A and B was seen when comparing between pre- and posttherapy, and no statistically significant difference when comparing posttherapy scores between the two studied groups.

Conclusion

There is no difference in improvement degree of pragmatics in the two age groups so starting therapy can be done at any age to improve the pragmatic skills of children.

Introduction

The pragmatic impairments are defined as inappropriate and ineffective use of language and gestures for social communication within the social contexts (Adams, 2005).

The long-term impact of pragmatic impairments is a risk factor for emotional and behavioral difficulties.

Many children with pragmatic language impairments experience problematic peer relationship and have a negative impact on the social participation that may

ultimately lead to a higher risk of mental health problems (Conti-Ramsden and Botting, 2004; Whitehouse *et al.*, 2009; Ketelaars *et al.*, 2010; Ellis Weismer 2013; Bishop, 2014).

There are two types of pragmatic impairments:

(1) Primary pragmatic impairments: it shows limitations of speech acts and inference arising directly from the limitations in social development irrespective of language status as in high functional autism (Dennis*et al.*, 2001).
(2) Secondary pragmatic impairments: due to the lack of language experience or very limited language repertoire as in specific language impairments and/ or learning disabilities (Prutting and Kittchner, 1987).

Diagnostic criteria of Social Communication Disorder in Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) (American Psychiatric Association, 2013; Swineford *et al.*, 2014):

(1) Persistent difficulties in the social use of verbal and nonverbal communication as in the following symptoms:
  (a) Impairments in the use of language for social communication purposes, such as greeting and asking for information.
  (b) Impairments in the ability to change the communication style to match context or the needs of the listener, such as speaking differently in an education sitting than on physical education classes, talking differently to a baby than to an adult like a father.
  (c) Impairments within the way of using conversation and storytelling rules, such as taking turns in conversation, rephrasing when misunderstood and breaking down, and impairments in knowing how to use verbal and nonverbal signals to manage the social communication and interactions.
  (d) Difficulties in understanding and making inferences of nonliteral language, idioms, humor, metaphors, multiple meanings that depend on the context for interpretation.
(2) The results of pragmatic deficits lead to functional limitations in effective communication, social participation, social relationships and academic achievement, or occupational performance.
(3) The onset of symptoms is within the early developmental period (but deficits cannot become completely evident until demands for social communication exceed the limited capacities).
(4) The symptoms are not due to any other medical or psychological condition or poor morphological, semantic and grammatical skills, and do not seem to be better explained by autism spectrum disorder, intellectual disability, global developmental delay, or another disturbance.

The interventions for pragmatic language impairments and social communication problems focus mainly on improving the main four elements that are social interactions, social cognition, language processing, and pragmatic skills; all the previous elements are very important for any effective social communication contexts (Adams, 2005).

The speech-language pathologists (SLPs) combine a direct approach (fostering remediation of impairment within the child) with an indirect approach (adaptation of the context to match the needs of the child) and the implementation of these interventions is often based on the individual profile of pragmatic impairments (Adams *et al.*, 2006).

The modified form of "Say and Do Positive Pragmatic Fun Sheets" program (Gill *et al.*, 2003) is a rehabilitation program that targets social communication skills and includes activities targeting how to give information, persuasion skills, requesting, problem solving, feelings and emotions, recognition and correction of inappropriate behaviors, using appropriate greeting and various politeness forms, and taking conversational turns in a specific topic.

Aim
This work aims to study the effect of age on pragmatic intervention to decide what age is more appropriate to give the better response of pragmatic impaired children.

Patients and methods
Patients
This study was conducted on 20 children with pragmatic impairments attending the Unit of Phoniatrics, in the outpatient clinic of Alexandria Main University Hospital.

Inclusion criteria
Children complaining of pragmatic impairments and delayed language of both sexes, in the age ranging from 5 to 8 years who were identified either by the complaint of the parents or by the results of formal assessment.

Group A: 10 children with pragmatic skill impairments aged (5–<6.5) years old.

Group B: 10 children with pragmatic skills impairments aged (6.5–8) years old.

Exclusion criteria

(1) Children with intellectual disability.
(2) Children with brain damage.
(3) Children with hearing impairment or visual impairment.
(4) Psychiatric problems [e.g., autistic spectrum disorder (ASD)].

Sample size calculation: performed by medical research institute—Department of Medical Statistics, Alexandria University.

Z-test power analysis: CL.0.95 N20 K2 n10 precision 0.05, Effect size 30.00.

So a minimal hypothesized total sample size of 20 Egyptian school-aged children with language impairment, both sexes (10 each group), is needed to detect assumed average proportional improvement in the pragmatic composite score (30%) for the two groups independently after conducting a scheduled training program taking in consideration 5% sample error and 95% level of confidence using χ^2 test.

Methods
Initial assessment
The children of the study were evaluated by the following protocol of assessment:

(1) Elementary diagnostic procedures:
   (a) History taking including personal data, complaint, analysis of symptoms, and detailed present, past, and family history.
(2) Clinical diagnostic aids:
   (a) Psychometric evaluation:
      (1) Stanford-Binet Scale 4th edition to assess mental age, verbal intelligence quotient, abstract intelligence quotient, and general intelligence quotient (?????, 1998).
      (2) Childhood Autism Rating Scale is conducted if needed to exclude autism spectrum disorder (Shopler *et al.*, 1986).
   (b) Arabic language test (Kotby *et al.*, 1995):
      (1) To assess receptive language, expressive language, semantics, and total language. The child's score was then compared with the mean of his age group to determine the child's language age and language defects.

   (c) Pragmatic skills evaluation:
      (1) Arabic version of Test of Pragmatic Language second edition (TOPL2), which is a subtest of Comprehensive Arabic language test, is used to assess pragmatic language skills (Ras and El-maghraby, 2008).
      (2) The test has four principal uses: identifying individuals with pragmatic language deficits, determining individual strengths and weaknesses, and documenting an individual's progress.
   (d) Audiological evaluation:
      (1) It is conducted if needed for the exclusion of audiological problems.
   (e) Ophthalmological evaluation:
      (1) It is conducted if needed for the exclusion of visual problems.

Intervention
The program was applied to all children in both studied groups A and B, in groups of 2–3 children according to age, general IQ, and total language score, one session per week, each session ranging from 45 to 60 min. The training sessions were administered by SLP in the Unit of Phoniatrics, Faculty of Medicine, Alexandria Main University Hospitals. The duration of therapy was about 3–6 months.

An informed consent was orally taken from parents and/or legally caring surrogate in addition to the child's assent of all children participating in the study.

Two types of interventions were applied that were:

(1) Direct intervention: it was typically delivered by SLP.
(2) Indirect interventions: typically consisted of advices and instructions to the parents or primary caregivers to support the generalization of social communication skills in the child's environment.

Parents were invited to attend the therapeutic sessions to observe and learn the therapeutic techniques to promote more effective communication with their children in the child's environment.

The following steps were applied during each therapeutic session for pragmatic impairments:

(1) At the beginning of each session:
   (a) Talking about the target, the concept, and the intent of the targeted social communication skill.

(b) Giving several examples about the targeted skill of the session before asking the child to take a turn.

(2) Then:

(a) Reading the instructions on the top of each funny sheet and explaining the instructions to the children to know how to play.

(b) Practicing the targeted social communication skill in the fun sheets of the chapter by asking each child to take one turn before beginning the second round in the game.

(c) Using different therapeutic techniques according to the nature of the targeted skill, for example, modeling, group work, role-play, and practicing the targeted pragmatic skill during conversations.

(d) Immediately after each child's turn, using praise in case of a correct answer but in case of an inappropriate answer, giving corrective feedback and asking the child to repeat the utterance to use the correct target form.

(e) Not finishing the activity sheet until each child used the targeted skill form correctly more often than not.

(3) At the end of the session: modeling the targeted social communication skill between the children or between children and their attended parents to stimulate the real conversation and generalization.

(4) Terminal criterion for any targeted social communication skill from one of the following (Paul, 1992):

(a) According to Paul (1992) in the "pragmatic activities for language intervention" program: the termination criterion is at the discretion of the clinician, in addition to the opinion and recommendation of the attended parents or primary caregiver.

The "Say and Do Positive Pragmatic Fun Sheets" program (Gill *et al.*, 2003)

"Say and Do Positive Pragmatic Fun Sheets" program helps children learn to use appropriate social communication skills in everyday situations by completing the fun sheets. The activities of fun sheets include a variety of engaging things to do including fill-ins, role-playing, stories, matching, and more. The fun sheets target a variety of social communication skills in the following areas:

(1) Giving information
(2) Requesting
(3) Persuasion
(4) Problem solving
(5) Greetings/politeness
(6) Appropriate interaction
(7) Feelings
(8) Topic maintenance

"Say and Do Positive Pragmatic Fun Sheets" is a fun program for students, aged from 5 to 13 years old who have social communication impairments. Some fun sheets can be done at home. All sheets need minimal preparation and do not consume the time of the sessions. Each targeted skill is introduced to the child by different activities; the used activities make the sessions more fun and the child more interested.

Each chapter targets one of the social communication skills and contains from 11 to 13 exercises. The exercises in each chapter are arranged in order from easier to more difficult level as in the appendix of this recent study.

Reassessment

The children of the studied groups were evaluated by the same protocol of assessment after a period of 6 months of therapy.

Statistical methodology

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0 (SPSS I, 2011).

Qualitative data were described using number and percent.

The Kolmogorov-Smirnov test was used to verify the normality of distribution (Lilliefors, 1967).

Quantitative data were described using range (minimum and maximum), mean, SD, median, and interquartile range.

The significance of the obtained results was judged at the 5% level.

The tests used in this study are:

(1) χ^2 test:
   For categorical variables, to compare between different groups.

(2) Fisher's exact or Monte Carlo correction:
   Correction for χ^2 when more than 20% of the cells have expected count less than 5.

(3) Student's *t* test:
   For normally distributed quantitative variables, to compare between two studied groups.

(4) Paired *t* test:
   For normally distributed quantitative variables, to compare between two periods.

(5) Pearson coefficient:
To correlate between two normally distributed quantitative variables.
(6) Mann-Whitney test:
For abnormally distributed quantitative variables, to compare between two studied groups.
(7) -Wilcoxon signed ranks test:
For abnormally distributed quantitative variables, to compare between two periods.

Results

Characteristics of the studied groups (Tables 1 and 2)

According to the Stanford-Binet intelligence scale (Table 1)
Table 1 shows no significant difference between the studied groups A and B regarding verbal IQ, abstract IQ, and general IQ.

According to pretest Arabic language test scores (Table 2)
In group A, the mean of receptive language was 79.40 with SD ±11.83, the mean of expressive language was 79.0 with SD ±10.35, the mean of semantics was 134.2 with SD ±6.53, and the mean of total language was 301.1 with SD ±26.36.

In group B, the mean of receptive language was 82.30 with SD ±10.77, the mean of expressive language was 84.20 with SD ±11.85, the mean of semantics was 140.1 with SD ±5.30, and the mean of total language was 315.6 with SD ±26.09.

No significant differences were detected between the studied groups A and B regarding receptive, expressive, and total language scores, whereas there was a highly significant difference between the two studied groups regarding the semantics of the language.

Table 1 Descriptive analysis of the studied groups according to Stanford-Binet intelligence scale (*n*=20)

IQ	Group A (*n*=10)	Group B (*n*=10)	*t*	*P*
Verbal IQ (VIQ)				
Min.–Max.	75.0–112.0	80.0–95.0	0.575	0.576
Mean±SD	91.70±11.26	89.50±4.45		
Median (IQR)	92.0 (88.0–96.0)	90.50 (88.0–93.0)		
Abstract IQ (AIQ)				
Min.–Max.	84.0–108.0	78.0–106.0	0.192	0.850
Mean±SD	91.70±8.19	91.0±8.12		
Median (IQR)	90.0 (84.0–96.0)	90.0 (88.0–98.0)		
General IQ				
Min.–Max.	70.0–99.0	78.0–91.0	0.593	0.564
Mean±SD	87.80±9.37	85.90±3.84		
Median (IQR)	89.0 (82.0–96.0)	85.50 (85.0–90.0)		

IQR, interquartile range. [t:] Student's *t* test group A: 5– <6.5. *P*: *P* value for comparison between the studied groups group B: ≥6.5–8.

Table 2 Distribution of the studied children in both groups A and B according to pretest Arabic language test scores

	Pretest Arabic language scores	Group A (*n*=10)	Group B (*n*=10)	*t*	*P*
Receptive language	Pre				
	Min.–Max.	54.0–91.0	60.0–94.0	0.573	0.574
	Mean±SD	79.40±11.83	82.30±10.77		
	Median (IQR)	83.0 (75.0–89.0)	85.50 (79.0–89.0)		
Expressive language	Pre				
	Min.–Max.	58.0–94.0	60.0–96.0	1.045	0.310
	Mean±SD	79.0±10.35	84.20±11.85		
	Median (IQR)	78.50 (75.0–85.0)	89.0 (80.0–92.0)		
Semantics	Pre				
	Min.–Max.	126.0–145.0	131.0–145.0	2.219*	0.040*
	Mean±SD	134.2±6.53	140.1±5.30		
	Median (IQR)	133.0 (129.0–136.0)	142.5 (135.0–145.0)		
Total language	Pre				
	Min.–Max.	250.0–336.0	261.0–342.0	1.236	0.232
	Mean±SD	301.1±26.36	315.6±26.09		
	Median (IQR)	305.5 (289.0–321.0)	324.5 (314.0–328.0)		

IQR, interquartile range. *t*: Student's *t* test group A: 5– <6.5. *P*: *P* value for comparison between the studied groups group B: ≥6.5–8. No significant differences were detected between the studied groups A and B regarding to receptive, expressive and total language scores, while there was a highly significant difference between the two studied groups regarding to the semantics of language.

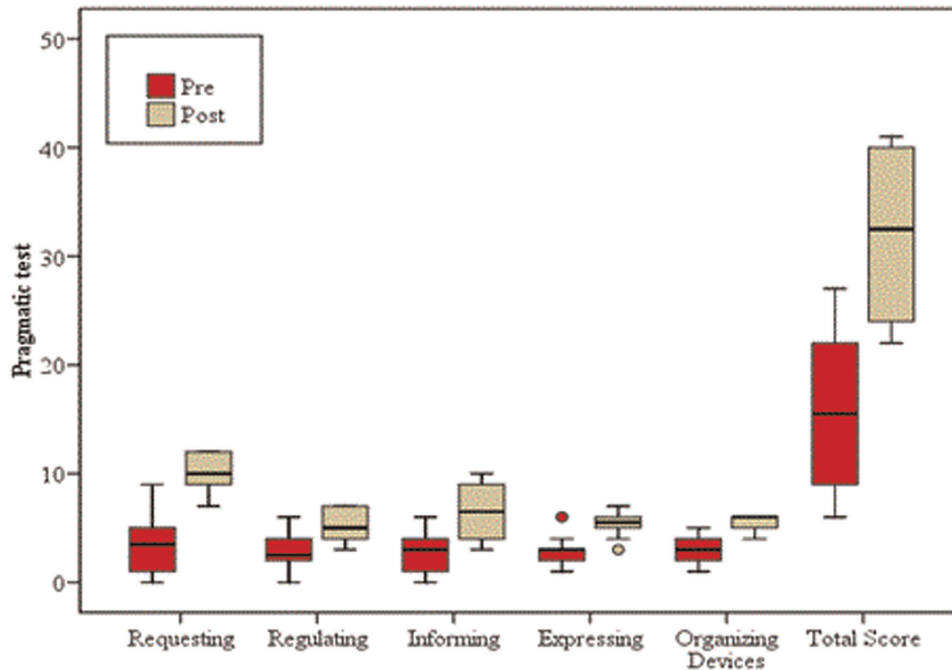## Comparison between the studied groups before and after therapy as regard to formal testing

Pragmatic skill evaluation by using the Arabic version of Test of Pragmatic Language second edition (Figs 1–3)
In group A, there was a statistically significant increase in regulating, informing, and expressing scores and a statistically highly significant increase in requesting, organizing devices, and total pragmatic scores.
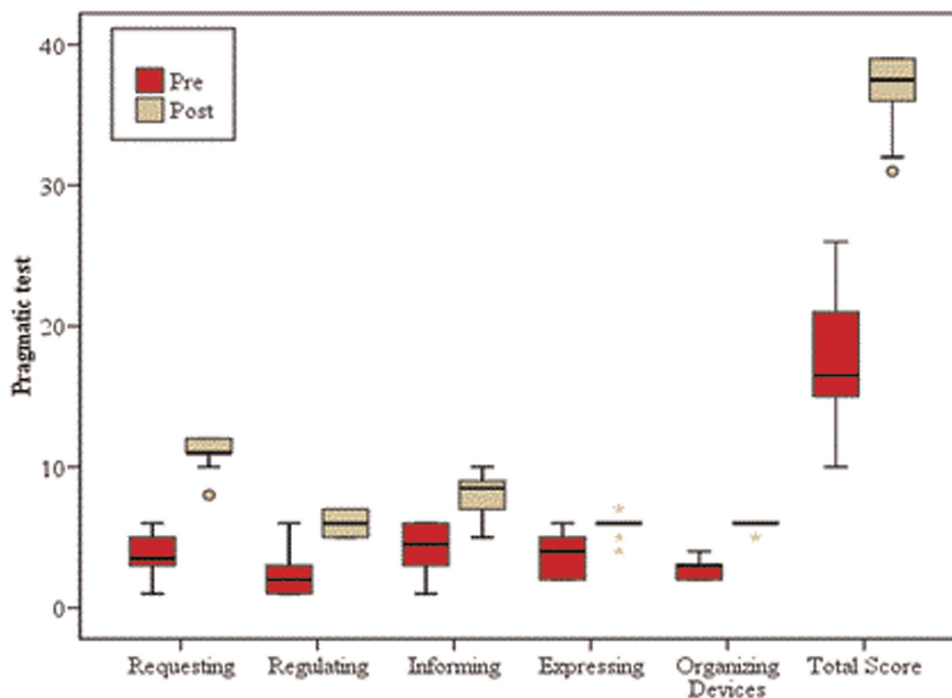
In group B, there was a statistically significant increase in expressing scores and a statistically highly significant increase in requesting, informing, organizing devices, and total pragmatic scores.

Figure 1

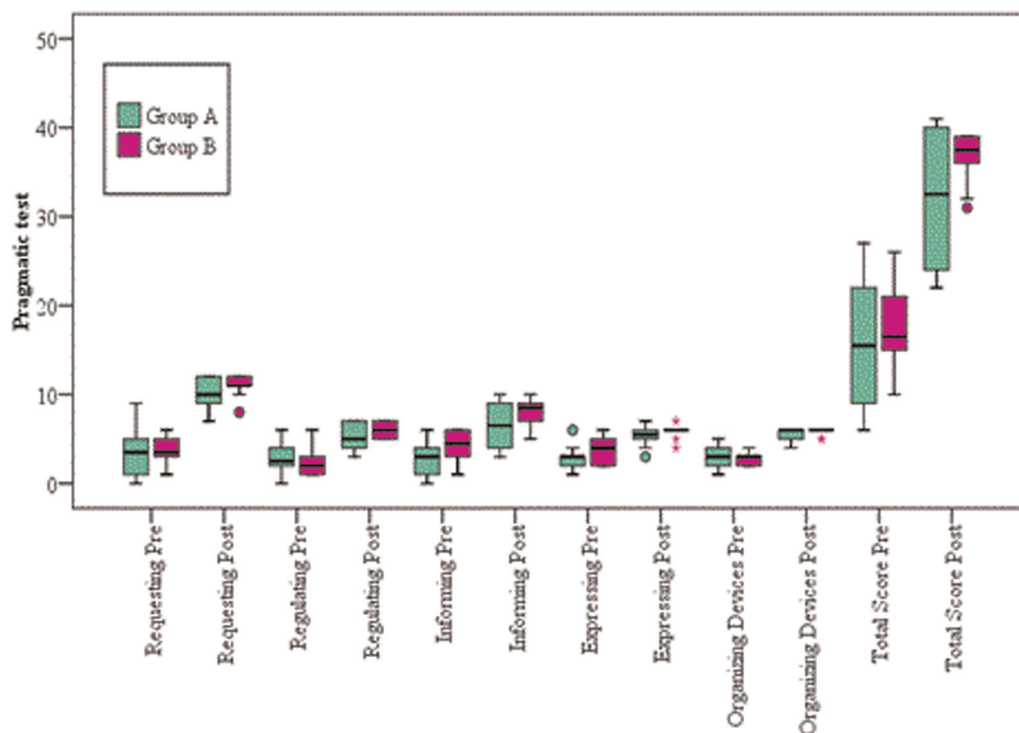Comparison between pre- and posttherapy of studied children in group A.

Figure 2

Comparison between pre- and posttherapy of studied children in group B.

However, no significant differences were detected between the studied groups A and B regarding regulating, informing, expressing, requesting, organizing devices, and total pragmatic scores in posttherapy results.

*Arabic language evaluation by using Arabic language test (Fig. 4)*

In group B, there was a statistically significant increase in semantics scores and statistically highly significant increase in receptive, expressive, and total Arabic language scores.

Figure 3

Comparison between pre- and posttherapy of both studied groups A and B according to Test of Pragmatic Language second edition.

Figure 4
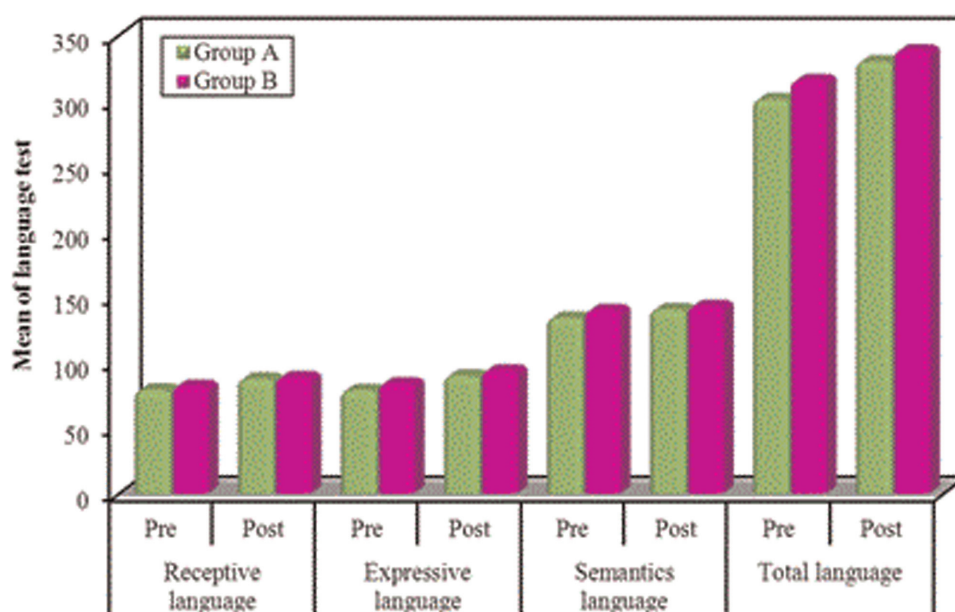
Comparison between pre- and posttherapy of both studied groups according to Arabic language test.

However, no significant differences were detected between the studied groups A and B regarding receptive, expressive, semantics, and total Arabic language scores in posttherapy results.

Comparison between both studied groups according to the improvement in pretest total pragmatic scores of TOPL2 (Table 3, Fig. 5)

There was no statistically significant difference in the improvement in pretest total pragmatic scores of TOPL2 of both studied groups A and B.,

In group A, the mean of increase in pretest total pragmatic scores was 17.20±2.44, whereas the mean of increase in pretest total pragmatic scores of group B was 19.10±4.07.

Discussion

Language assessment

Standardized tests of language proved to be essential as outcome measures for pragmatic language intervention because most children showed strong signals of change in language skills (Adams *et al.*, 2006).

The current study showed a consistent pattern of improvement in all items of the Arabic language test in both studied groups A and B. This improvement could be explained in the study of Adams *et al.* (2006) in which the study was conducted on six children aged between 5 and 9 years with pragmatic language impairments who received 8 weeks of intensive pragmatic intervention. The six children were assessed before and after therapy by Assessment of Comprehension and Expression (Adams, 2011) and Clinical Evaluations of Language Fundamentals Test (CELF) (Semel *et al.*, 2000). These changes could be explained as a generalized effect of treatment due to the changes that were made in the children's social environments by the teachers and parents of six children. Another contributory factor may be increases in confidence and motivation toward language as a result of the intervention (Adams *et al.*, 2006).

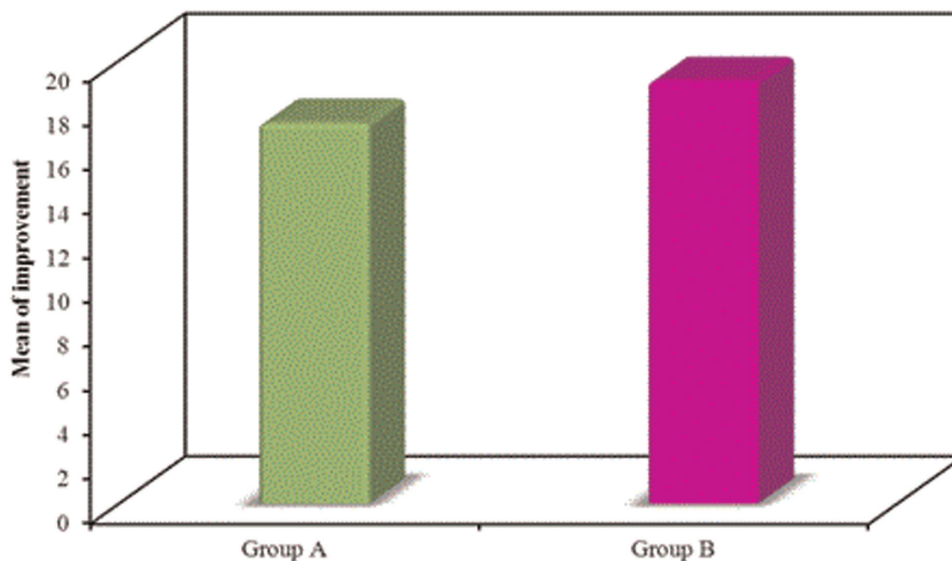### Test of Pragmatic Language-2nd edition (TOPL2)

The current study showed a consistent pattern of improvement in all items of the Arabic version of TOPL2 in both studied groups A and B. The

Table 3 Comparison between both studied groups according to the improvement in pretest total pragmatic scores of TOPL2

Improvement changes	Group A (*n*=10)	Group B (*n*=10)	*t*	*P*
Min.–Max.	13.0–21.0	12.0–25.0	1.267	0.221
Mean±SD	17.20±2.44	19.10±4.07		
Median (IQR)	18.0 (15.0–18.0)	19.0 (16.0–22.0)		

IQR, interquartile range; TOPL2, Test of Pragmatic Language second edition. *t*: Student's *t* test. *P*: *P* value for comparison between the studied groups.

Figure 5

Comparison between both studied groups A and B according to the improvement in pretest total pragmatic scores of Test of Pragmatic Language second edition.

average range of TOPL2 in group A was 9–22 in pretherapy assessment and increased to the average range of 24–40 in posttherapy assessment and the average improvement range between pretest and posttest scores was 18.0 (15.0–18.0). The average range of TOPL2 in group B was 15–21 in pretherapy assessment and increased to the average range of 36–39 in posttherapy assessment and the average improvement range between pretest and posttest scores was 19.0 (16.0–22.0).

Data were consistent with the recent results demonstrated in the study of Hyter *et al.* (2001) in which six participants were assessed before and after therapy for pragmatic language abilities by the TOPL. The intervention sessions occurred over an 8-week period and were scheduled twice weekly and the duration of each session was 30 min. Pretesting on the TOPL indicated that all participants were in the below-average range (80–89) and the posttest scores indicate that three participants' scores increased to the average range (90–110) and the other three participants improved to the above-average range (111–120) and the results of the statistical analysis were that the *t* tests yielded statistically significant differences at the 0.01 level between pre- and posttest scores on the TOPL. Most participants' TOPL scores changed after the intensive pragmatic intervention that had a positive effect on pragmatic skills especially describing information, giving directions (step by step), stating personal opinions about inappropriate behavior (judgments), and negotiating for desired outcomes (Hyter *et al.*, 2001).

The results of the current study could also be explained by the study of Adams *et al.* (2012).

In that study, a single-blind randomized controlled trial (RCT) design was used to detect and evaluate the effectiveness of Social Communication Intervention Project (SCIP) for the students who have pragmatic impairments with or without features of ASD. The experimental treatment was an intensive manualized social communication intervention that aimed to improve the impairments in semantics and high-level language skills, pragmatic difficulties, and social interaction. The 88 children with pragmatic and social communication impairments, aged 5 year and 11 months, 10 year and 8 months were randomly distributed in a 2 : 1 ratio to SCIP or treatment-as-usual (TAU). Every student in the SCIP condition received up to 20 sessions of direct intervention. The results of two interventions (SCIP or TAU) were assessed before therapy, immediately after therapy,

and at 6-month follow-up by CELF Fourth Edition (Semel *et al.*, 2006) and Core Language Standard Score (CLSS) for language skills and parent-reported pragmatic functioning and social communication, teacher-reported ratings of classroom learning skills, and blind-rated perceptions of conversational competence for social communication skills.

The result of the SCIP intervention compared with TAU on standardized language assessment was no significant intervention effect on the structural language measures (CELF-4 and CLSS), and these results were not consistent with the results of the current study and the explanations of this contradiction between the two studies were that over one-third of participants were performing well within the normal range on CELF-4 and CLSS at pretherapy assessments. The standardized language assessments lacked the sensitivity to the impairments of a high-level language and big changes in raw scores were required to show the shifts in the standard scores of language assessments. There were significant remediation effects of the SCIP intervention when compared with TAU on the social communication skills after the comparison between pre- and posttherapy by the all previously mentioned tests and reports (Adams *et al.*, 2012).

In the recent study, no significant differences were detected between the two studied groups A and B regarding posttherapy Arabic language test and Arabic version of TOPL2 scores. These results might be because no significant differences were detected in pretherapy TOPL 2, Arabic language test, Stanford-Binet test scores that indicate matching of both groups. According to demographic data, 70% of group A were above 5 years and 6 months of age, whereas 60% of group B were around the age of 6 years and 6 months that indicates a lack of low extreme ages of group A and a lack of high extreme ages of group B so the studied samples of both groups A and B were not suitable to study the effect of the training program on different age groups.

Conclusion

There is no difference in improvement degree of pragmatic skills in the two age groups so starting therapy can be done at any age to improve the pragmatic skills of children.

Recommendations

The study should be applied on wider age groups to decide the better age of application of the intervention program to obtain better and faster results.

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