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Systematic Review (Pages: 19990-20008)

The Prevalence of Speech Disorders in Iran: Systematic Review and Meta-Analysis

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Abstract

Background: Speech disorders are common communication difficulties in childhood, which can have a negative impact on a person's quality of life. This systematic review and meta-analysis aimed to estimate the prevalence rate of various types of speech disorders in preschool and elementary school students in Iran.

Materials and Methods: A systematic search was conducted in national and international databases, including Magiran, SID, PubMed, Google Scholar, Scopus, and Web of Science, from March 30, 2000, to March 30, 2025. The quality assessment was evaluated by the Joanna Briggs Institute (JBI). All statistical analyses were performed using Comprehensive Meta-Analysis (CMA) software.

Results: A total of 15 studies, comprising 24983 students, were included in the meta-analysis. The pooled prevalence of speech disorders among preschool and elementary school children in Iran was 8.7% (boys 10.3% and girls 7%). The prevalence of speech disorders in preschool, first, second, third, fourth, and fifth-grade students was 11.5%, 10.1%, 7.1%, 8.7%, 9%, and 8.1%, respectively. The pooled prevalence of speech sound disorders, stuttering, and voice disorders was 7%, 1.9%, and 2.3%, respectively.

Conclusions: The results of this study reveal that approximately one in 10 Iranian students has a speech disorder, with higher rates in preschool children.

Key Words: Prevalence; Speech Disorders; Speech Sound Disorders; Stuttering; Students; Voice Disorders.

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1- INTRODUCTION

Speech disorders are among the most common communication difficulties in childhood, including speech sound disorders, stuttering, and voice disorders (Dysphonia), which may affect children's classroom engagement and socio-emotional development if not identified early (1-3). Speech sound disorders (SSD) are a common problem among children. Children with SSD have difficulties producing intelligible speech, which affects the acceptability and understanding of speech, whether of known origin (such as Down syndrome, hearing loss, and cleft lip and palate) or of unknown origin (4, 5). Stuttering is a fluency disorder characterized by disruptions in the flow of speech. Stuttering is characterized by sound or syllable or whole-word repetitions, sound and syllable prolongations (e.g., "mmummy"), unnecessary pauses, and physical tensions when speaking (6, 7). In general, any inappropriate voice quality (qualitative assessment) indicates voice disorders in a child. Voice disorders in speech are characterized by hoarseness, inappropriate pitch, or changes in volume (8-10).

Globally, epidemiological data indicate that approximately 7% of children in the United States experience communication disorders involving speech disorders (11, 12). Population-based studies from other countries have also reported considerable prevalence of speech disorders among preschool children (13, 14). Furthermore, studies conducted in Egypt have shown a stuttering prevalence of approximately 1% among primary school children, highlighting cross-cultural variability in speech disorder prevalence (7).

In Iran, a number of descriptive studies have examined the prevalence of speech disorders among preschool and primary school children across diverse regions and age groups (1-3, 15-18). These studies have investigated several subtypes of speech disorders, including the SSD (19-21), stuttering (fluency disorder) (15, 22), and voice disorders (18, 23). They reported a wide range of prevalence estimates, ranging from 2% (15) to 55% (It is screening and perceptual, and information about the validity of the tool is not available) (16) of the Iranian student population. For example, a large community sample in Yazd reported a total speech disorder prevalence of 14.8% among primary school students (1), while in Shahrekord preschoolers the overall prevalence was 17.1% (24). Other Iranian studies have documented varied rates across provinces such as Zanjan (2), Kermanshah (17), Arak (18), and Mashhad (25).

Despite the existence of multiple regional prevalence studies within Iran, differences in methodology, age groups, and tools have resulted in heterogeneous prevalence estimates that are difficult to compare directly. Recently, a study reported the prevalence of learning disabilities among Iranian elementary school students as a systematic review and meta-analysis (26). But the prevalence of speech disorders that directly affect academic participation and classroom communication (13, 25) has not yet been systematically investigated. To date, no systematic review, meta-analysis, or even qualitative review has been conducted in Iran to synthesize findings from different regions and provide a national pooled estimate of the prevalence of speech disorders in the Iranian preschool and primary school populations. Therefore, a comprehensive synthesis of the prevalence rates of various speech disorders in Iranian students is essential to inform policy-making, screening practices, speech therapy resources allocation, and planning of early screening and early intervention services. Hence, the present study aimed to conduct a systematic review and meta-analysis to estimate the pooled prevalence of speech disorders

among preschool and primary school students in Iran.

2- MATERIALS AND METHODS

2-1. Study Design and Setting

This study was conducted as a systematic review and meta-analysis to estimate the overall prevalence of speech disorders and the prevalence of their types (SSD, stuttering, and voice disorders) among preschool and elementary school children in Iran. The methodology followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (27).

2-2. Search Strategy

A comprehensive and systematic search was performed to identify all relevant studies reporting the prevalence of speech disorders among Iranian children. The Web of Science, PubMed, Scopus, Google Scholar, Magiran, and SID (Scientific Information Database) were systematically searched from March 30, 2000, to March 30, 2025. The search terms related to speech disorders, prevalence, Iran, and children were selected based on Medical Subject Headings (MeSH). The main English search terms included combinations of:

(Speech Disorders OR Stuttering OR Voice Disorders OR speech sound disorder* OR articulation disorder* OR phonological disorder* OR fluency disorder) AND (Prevalence OR epidemiolog* OR frequency OR occurrence) AND (Child OR preschool* OR Preschool Child OR Student OR kindergarten OR primary school OR elementary school) AND (Iran OR Iranian).

2-3. Eligibility Criteria

2-3-1. Inclusion Criteria

Studies were included if they met all of the following criteria:

1. Original studies (cross-sectional or population-based designs)

2. Reported prevalence data on speech disorders

3. Conducted among preschool (≤6 years) or primary school children (6–12 years)

4. Study population located in Iran

5. Speech disorders assessed included articulation disorders (speech sound disorders), fluency disorders (stuttering/nonfluency), or voice disorders

6. Published in Persian or English

2-3-2. Exclusion Criteria

Studies were excluded if they:

• If the sample had been taken from clients of clinics or special schools

• Focused exclusively on language disorders (e.g., specific language impairment, language delay)

• Included children with known neurological disorders, intellectual disability, hearing loss, autism spectrum disorder, or craniofacial anomalies without separate prevalence reporting

• Were case reports, reviews, editorials, theses, conference abstracts, or psychometric studies

• Lacked sufficient data to calculate prevalence estimates (based on gender or educational level).

2-4. Study Selection

All retrieved records were imported into a reference management software (EndNote X9), and duplicates were removed. Both authors independently screened titles and abstracts for eligibility. Full texts of relevant articles were reviewed independently. Disputes were resolved through discussion or consultation with each other. The study selection process was documented using a PRISMA flow diagram.

2-5. Data Extraction

Data were independently extracted by two authors using a data extraction form. Extracted information included: First author, year of publication, location of study, sample size, children's educational level (preschool or grade of primary school), type of speech disorder assessed, diagnostic or screening tools used, number of children with speech disorders or reported prevalence (%). During data extraction from included studies, if a child had multiple disorders at the same time, it was counted only once in the overall prevalence but repeated in subgroups.

2-6. Quality Assessment

The methodological quality of included studies was assessed independently by two authors using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Prevalence Studies (28). The JBI assesses potential sources of bias associated with sample selection, outcome measurement, and statistical analysis. The methodological quality of all studies was scored in percentages based on the JBI criteria.

2-7. Statistical Analysis

This meta-analysis was conducted using the Comprehensive Meta-Analysis (CMA), version 3.0. The effect size in this study was calculated based on the number of events and sample size. The pooled prevalence of speech disorders was calculated with corresponding 95% confidence intervals (CIs). Due to anticipated heterogeneity across studies, a random-effects model was applied. Subgroup analysis was performed based on the type of speech disorder, gender, and education level of Iranian students.

The I^2 statistic and Cochran's Q test were used for assessing statistical heterogeneity. The I^2 values of 25%, 50%, and 75% represent low, moderate, and high heterogeneity, respectively. Funnel plot visualization and Egger's regression test were used to assess publication bias. This meta-analysis of prevalence was conducted using a random-effects model, which directly accounts for the binomial distribution of the event counts and sample sizes. This approach was chosen to ensure accurate estimation without the need for data transformation, thereby avoiding potential biases associated with the back-transformation of transformed proportions.

3-RESULT

3-1. Study Selection

A total of 4173 records were initially identified through database searching. After removing duplicates, 261 articles remained for title screening. Following title screening, 121 articles remained for abstract screening. Based on inclusion and exclusion criteria, 25 full-text articles were assessed for eligibility. Ultimately, 15 studies were included in the systematic review and meta-analysis. The study selection process is shown in the PRISMA diagram (Figure 1).

3-2. Characteristics of Included Studies

The methodological quality of the reviewed studies based on the JBI is reported in Table 1. The mean score of the articles reviewed in this study was 94.8%. All reviewed studies had a cross-sectional design.

The 15 included studies were conducted across various provinces of Iran, covering both urban and rural areas. In this study, we had data from 12 provinces of Iran, specifically: 3 articles each from shiraz, 2 articles each from Tehran and Kermanshah, and 1 article each from Semnan, Razavi Khorasan, Ahvaz, Chaharmahal Bakhtiari, Isfahan, Bushehr, Yazd, and Markazi.

The reviewed publication years ranged from 2002 to 2022, with sample sizes varying between 118 and 7881 participants. Six studies examined the

prevalence of speech disorders only in Iranian preschool children, nine studies examined the prevalence of speech disorders only in Iranian elementary school children, and only one study examined the prevalence of speech disorders in both preschool and school children. A detailed summary of study characteristics is presented in Table 2.

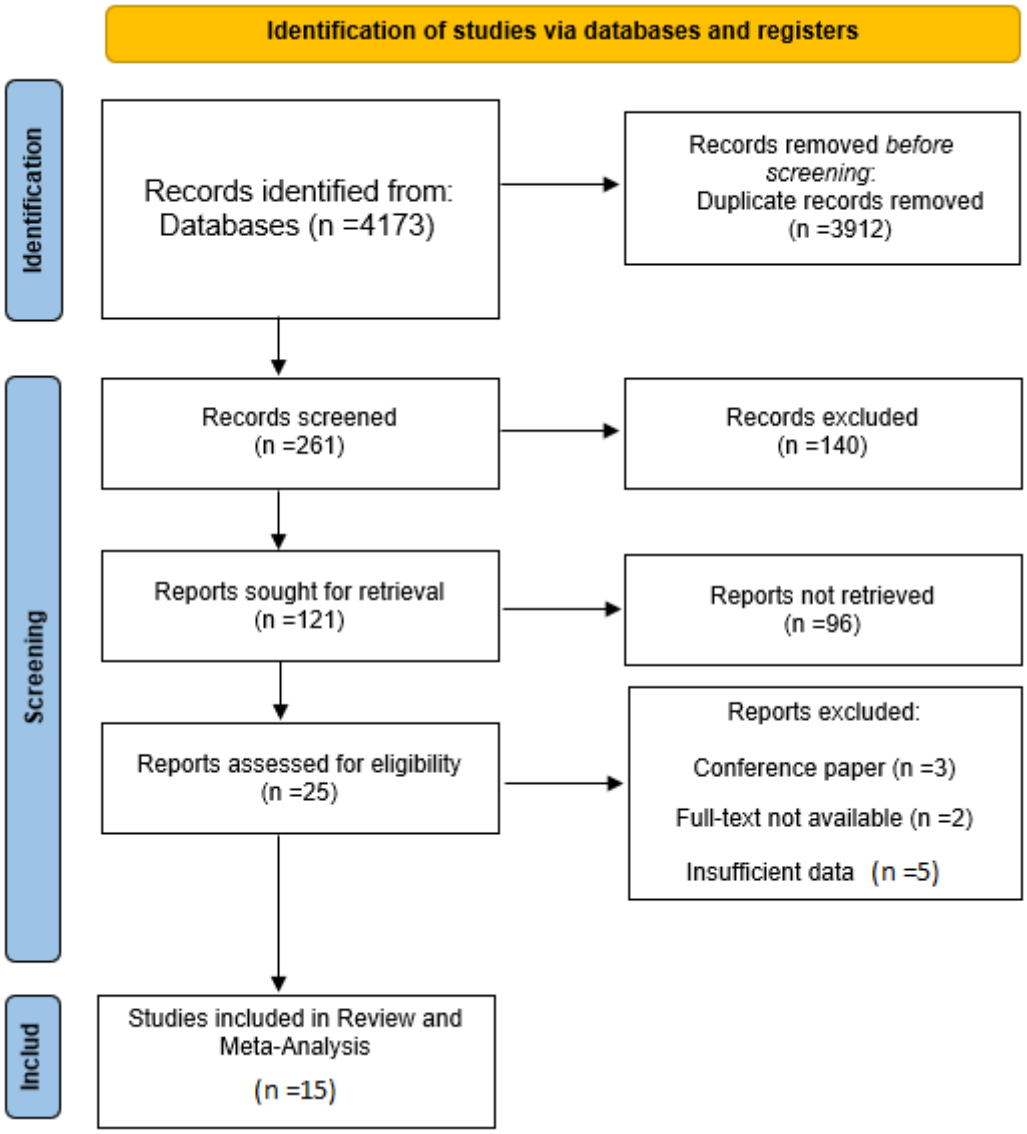

Figure-1: PRISMA Diagram for the Meta-analysis of prevalence of speech disorder in Iran.

3-3. Meta-analysis results

3-3-1. Pooled Prevalence of Speech Disorders

The prevalence of speech disorders was analyzed in a total of 13 included articles on 23,173 preschool and elementary school students, of which 48% (11,142 students) were male and 52% (12,031 students) were female. The pooled prevalence of speech disorders among Iranian preschool and elementary school students was estimated at 8.3% (95%CI:6.4%–10.6%) based on the random-effects model (I^2 = 94.8%, $p < 0.001$) (Figure 2). The prevalence of speech disorders in boys and girls, preschool and elementary school students was 10.3% (95%CI:7%-14.8%) and 7% (95%CI:5%-9.8%), respectively (Figure 2, Figure 10, and Table 3).

Table-1. Methodological quality of the included studies based on the JBI.

Study	1	2	3	4	5	6	7	8	9	Total Score (%)
Shahbodaghi (3)	+	+	+	+	+	+	+	+	+	100
Karbasi (1)	+	+	+	+	+	+	+	+	+	100
Sadollahi (20)	+	+	+	+	+	+	+	+	+	100
Mohammadi (15)	+	+	+	+	+	+	+	+	+	100
Khorramshahi (22)	+	+	+	+	+	+	+	+	+	100
Soleimani (17)	+	+	+	+	+	+	+	+	+	100
Mohammadzadeh (23)	+	+	+	+	+	+	+	+	+	100
Yavari (18)	+	+	+	+	+	+	+	+	+	100
Oryadi-Zanjani (29)	+	+	-	+	+	+	+	-	+	78
Oryadi-Zanjani (30)	+	+	-	+	+	+	-	+	+	78
Mohamadi (24)	+	+	+	+	+	+	+	+	+	100
Hatami (21)	+	+	+	+	+	+	+	+	+	100
Rezania (16)	+	+	+	+	+	+	-	-	+	78
Gholamiyan (25)	+	+	+	+	+	+	+	+	+	100
Aghaz (19)	+	+	-	+	+	+	+	+	+	89
Total (%)	**100**	**100**	**80**	**100**	**100**	**100**	**86.7**	**86.7**	**100**	**94.8**

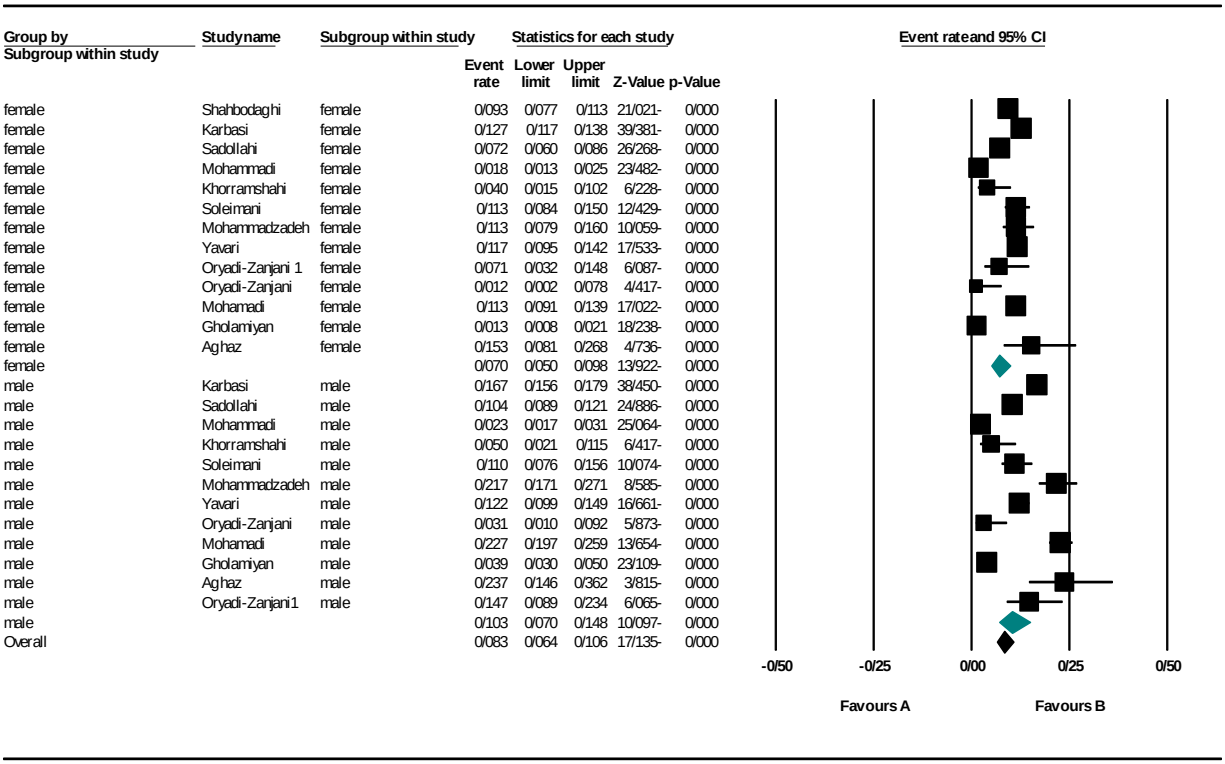

Figure-2: The prevalence of speech disorders in Iranian students according to sex.

To calculate the prevalence of speech disorders in different grades, were included the results of 15 articles (24,983 preschool and elementary school students). The number of students in preschool, first, second, third, fourth, and fifth grades was 4,161, 9,912, 2,199, 1,750, 1,189, and 1147, respectively. The overall pooled prevalence of speech disorders in Iranian elementary school students in preschool, first, second, third, fourth, and fifth grades was estimated to be 11.5%, 10.1%, 7.1%, 8.7%, 9%, and 8.1%, respectively (Figure 3, Figure 11, and Table 3).

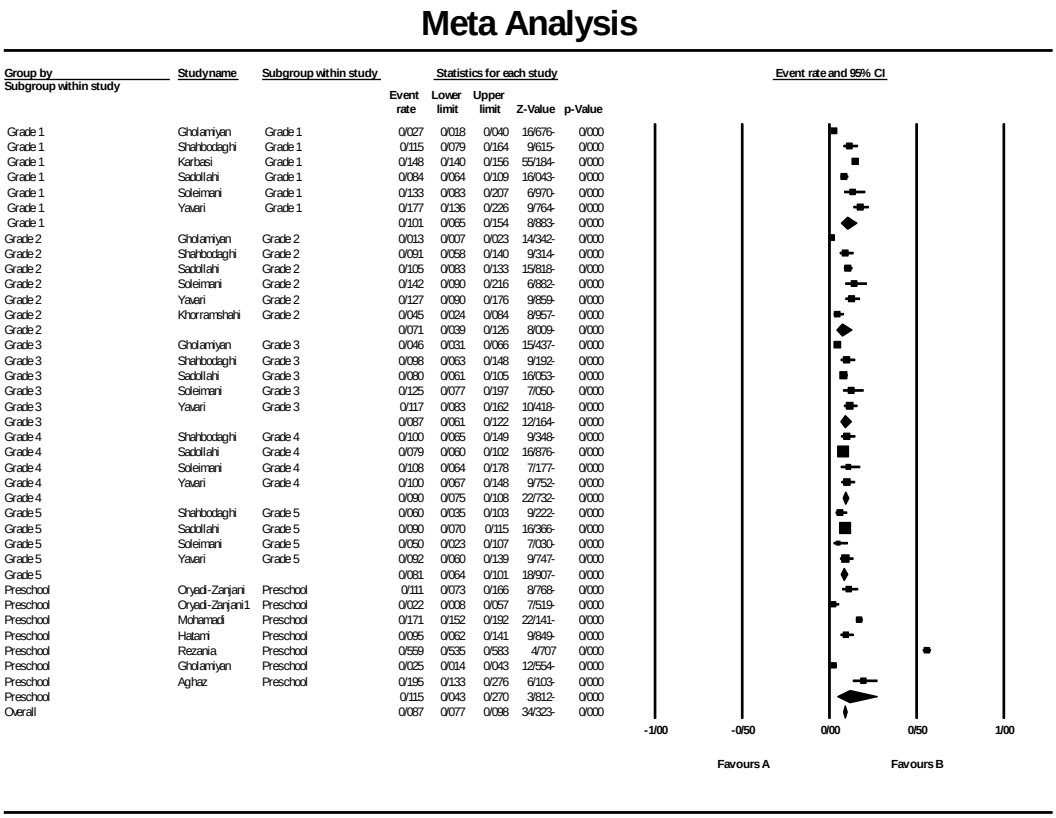

Figure-3: The prevalence of speech disorders in Iranian students according to academic grades.

3-3-2. Pooled Prevalence of SSD

The prevalence of SSD was analyzed in a total of 8 included articles, covering 16,542 preschool and elementary school students. Of these 47.7% (7,896 students) were male and 52.3% (8,646 students) were female. The pooled prevalence of SSD among Iranian preschool and elementary school students was estimated at 7% (95% CI:5.1%–9.4%) using the random-effects model (I^2 = 91.6%, $p < 0.001$). The prevalence of SSD in boys and girls in preschool and elementary school was 8.7% (95%CI:5.6%-13.4%) and 5.6% (95%CI:3.7%-8.6%), respectively (Figure 4, Figure 10, and Table 3).

To calculate the prevalence of SSD in different grades, we included the results of 12 articles involving 20,345 preschool and elementary school students. The number of students in preschool, first, second, third, fourth, and fifth grades were 4,161, 9,515, 1,643, 1,373, 850, and 810, respectively. The pooled prevalence of SSD in Iranian preschool and elementary school students was estimated to be 5.4%, 6.4%, 3.1%, 3.6%, 7.5%, and 5.6%, in preschool, first, second, third, fourth, and fifth grades, respectively (Figure 5, Figure 11, and Table 3).

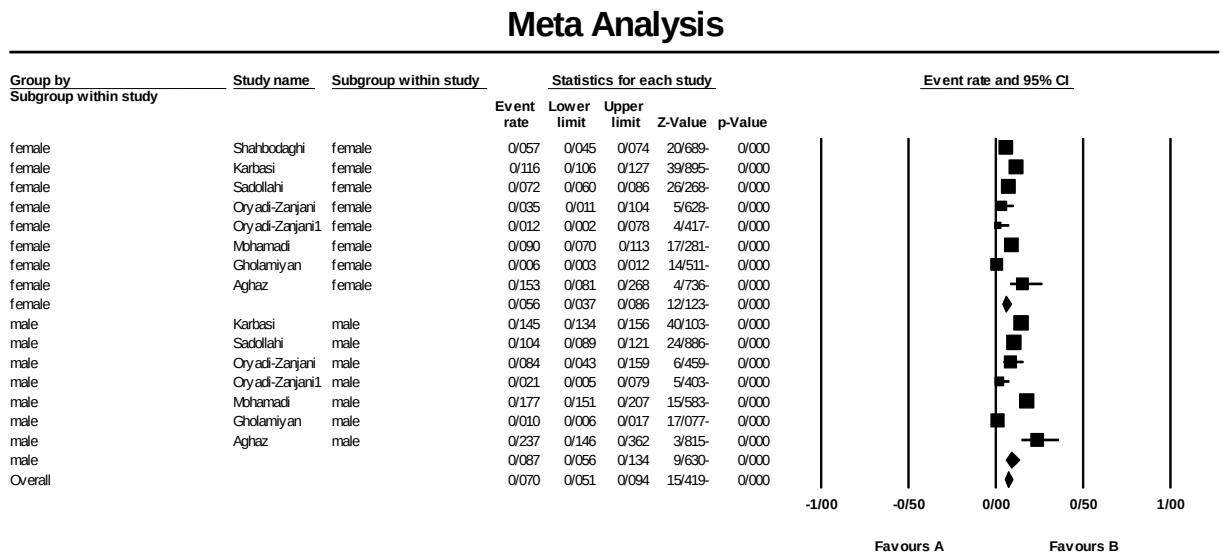

Figure-4: The prevalence of SSD in Iranian students according to sex.

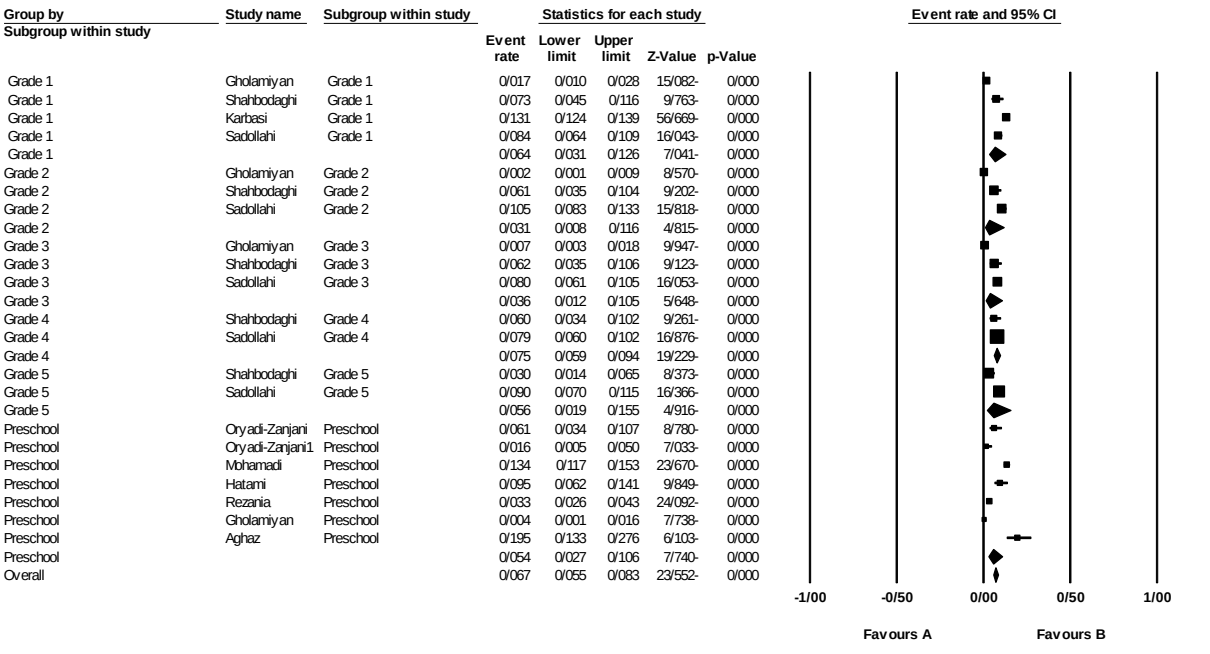

Figure-5: The prevalence of the SSD in Iranian students according to academic grades.

3-3-3. Pooled Prevalence of Stuttering

The prevalence of stuttering was analyzed in a total of 8 included articles, which focused on 17,548 preschool and elementary school students. Of these student 48.3% (8485 students) were male and 51.7% (9063 students) were female. The pooled prevalence of stuttering among Iranian preschool and elementary school students was estimated at 1.9% (95% CI:1.4%–2.5%) based on the random-effects model (I^2 = 90.09%, $p < 0.001$). The prevalence of stuttering in boys and girls in preschool and elementary school was 2.3% (95%CI:1.6%-3.2%) and 1.1%

(95%CI:0.6%-1.9%), respectively (Figure 6, Figure 10, and Table 3).

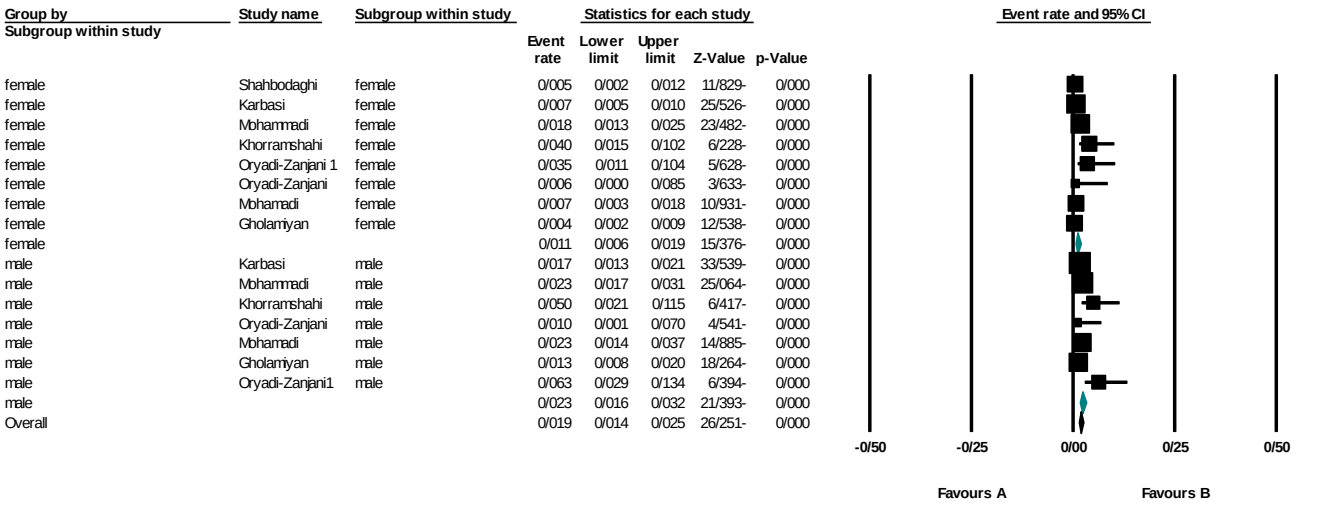

Figure-6: The prevalence of stuttering in Iranian students according to sex.

To calculate the prevalence of stuttering in different grades, we included the results of 11 articles with a total of 21,129 preschool and elementary school students. The number of students in the preschool, first, second, third, fourth, and fifth grades was 3,821, 8,929, 1,263, 786, 201, and 199, respectively. The pooled prevalence of stuttering in the preschool, first, second, third, fourth, and fifth grade Iranian preschool and elementary school students was estimated to be 2.5%, 0.7%, 1.1%, 1.4%, 0.5% and 1%, respectively (Figure 7, Figure 11, and Table 3).

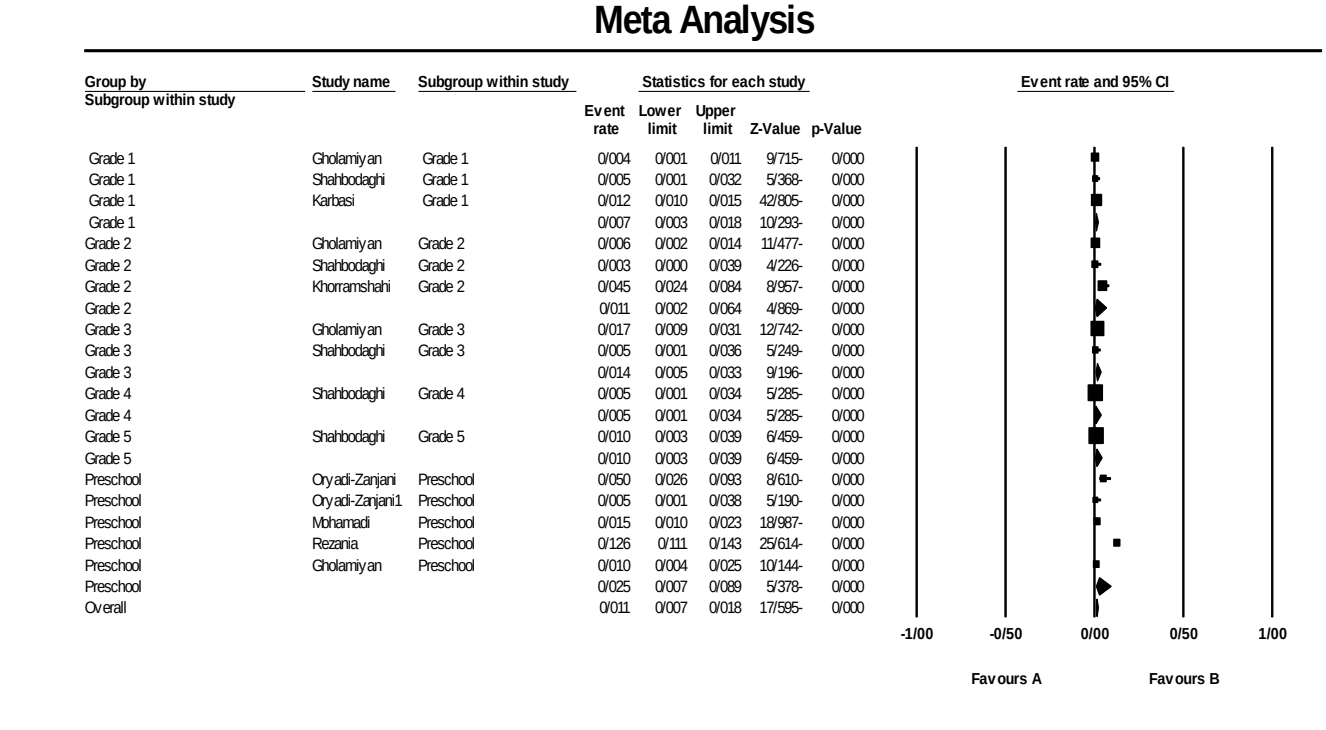

Figure-7: The prevalence of stuttering in Iranian students according to academic grades.

3-3-4. Pooled Prevalence of Voice Disorder

The prevalence of voice disorders was analyzed in a total of five included articles on 13,549 preschool and elementary school students, of which 47.7% (6,475 students) were male and 52.3% (7,074 students) were female. The pooled prevalence of voice disorders (dysphonia) among Iranian preschool and elementary school students was estimated at 1.9% (95% CI:0.7%–5.3%) based on the random-effects model (I^2 = 95.6%, p < 0.001). The prevalence of voice disorders in boys and girls, preschool and elementary school students, was 2.8% (95%CI:0.5%-15.6%) and 1.6% (95%CI:0.4%-5.5%), respectively (Figure 8, Figure 10, and Table 3).

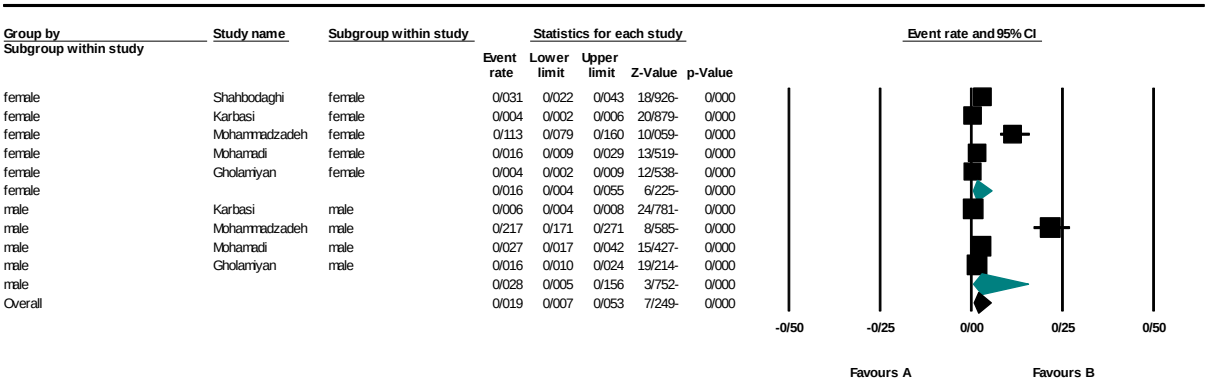

Figure-8: The prevalence of voice disorders in Iranian students according to sex.

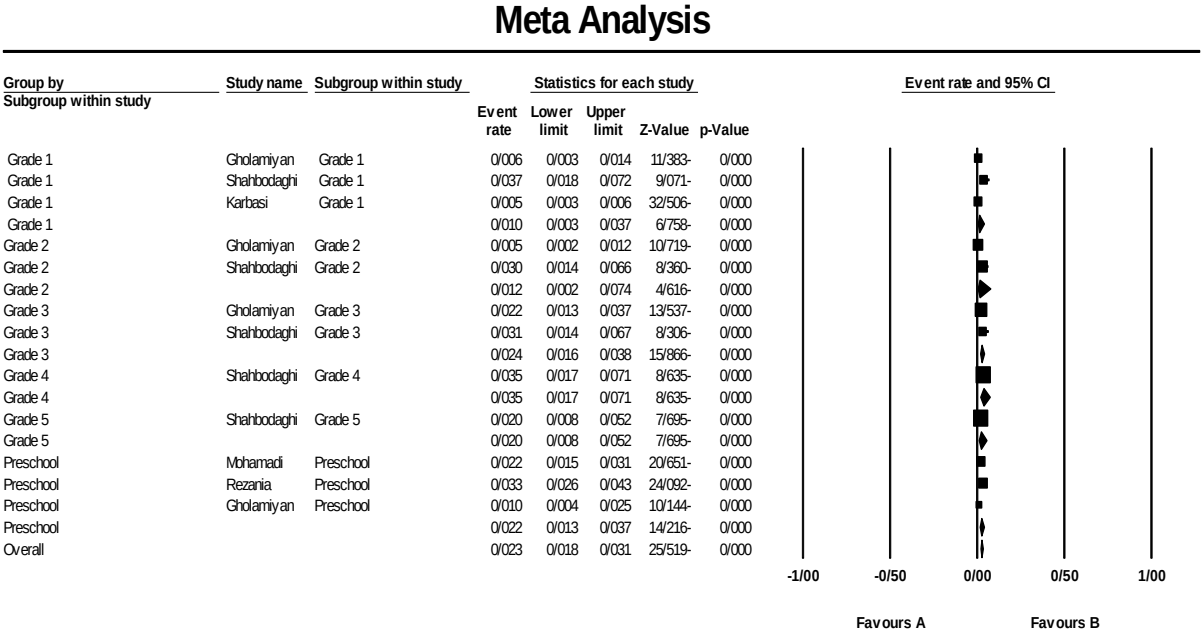

Figure-9: The prevalence of voice disorders in Iranian students according to academic grades.

Table-2. Characteristics of included studies.

Study	Location & date	Sample size (n)	Diagnostic Method	Prevalence of Voice Disorder (n)	Prevalence of SSD (n)	Prevalence of Stuttering (n)	Prevalence of Speech Disorder (n)
Shahbodaghi (3)	Tehran 2002	Total:1010 Girl:1010 1st: 218 2nd: 198 3rd: 194 4th: 201 5th: 199	Telling the story from the serial images	Total: 31 Girl: 31 1st: 8 2nd: 6 3rd: 6 4th: 7 5th: 4	Total: 58 Girl: 58 1st: 16 2nd: 12 3rd: 12 4th: 12 5th: 6	Total: 5 Girl: 5 1st: 1 2nd: 0 3rd: 1 4th: 1 5th: 2	Total: 94 Girl: 94 1st: 25 2nd: 18 3rd: 19 4th: 20 5th: 12
Karbasi (1)	Yazd 2005	Total: 7881 Boy: 4117 Girl: 3764 1st: 7881	face-to-face screening by the SLP	Total: 37 Boy: 23 Girl: 14 1st: 37	Total: 1033 Boy: 596 Girl: 437 1st: 1033	Total: 96 Boy: 69 Girl: 27 1st: 96	Total: 1166 Boy: 688 Girl: 478 1st: 1166
Sadollahi (20)	Semnan 2004	Total: 3013 Boy: 1433 Girl: 1580 1st: 586 2nd: 580 3rd: 587 4th: 649 5th: 611	PPIT face-to-face screening by the SLP	-	Total: 263 Boy: 149 Girl: 114 1st: 49 2nd: 61 3rd: 47 4th: 51 5th: 55	-	Total: 263 Boy: 149 Girl: 114 1st: 49 2nd: 61 3rd: 47 4th: 51 5th: 55
Mohammadi (15)	Javanrud 2008	Total: 3937 Boy: 1981 Girl: 1956 1st: NR 2nd: NR 3rd: NR 4th: NR 5th: NR	face-to-face screening by the SLP	-	-	Total: 81 Boy: 46 Girl: 35	Total: 81 Boy: 46 Girl: 35
Khorramshahi (22)	Ahwaz 2011	Total: 200 Boy: 100 Girl: 100 2nd: 200	face-to-face screening by the SLP	-	-	Total: 9 Boy: 5 Girl: 4 2nd: 9	Total: 9 Boy: 5 Girl: 4 2nd: 9
Soleimani (17)	Kermanshah 2011	Total: 600 Boy: 237 Girl: 363 1st: 120 2nd: 120 3rd: 120 4th: 120 5th: 120	PPIT face-to-face screening by the SLP	Total: 7	Total: 60	Total: 0	Total: 67 Boy: 26 Girl: 41 1st: 16 2nd: 17 3rd: 15 4th: 13 5th: 6
Mohammadzadeh (23)	Tehran 2013	Total: 501 Boy: 263 Girl: 238 4th: NR 5th: NR	Parents Opinion Questionnaire	Total: 84 Boy: 57 Girl: 27	-	-	Total: 84 Boy: 57 Girl: 27
Yavari (18)	Arak 2014	Total: 1393 Boy: 665 Girl: 728 1st: 277 2nd: 236 3rd: 257 4th: 219 5th: 217 6th: 186	PPIT face-to-face screening by the SLP	Total: 49	Total: 111	Total: 14	Total: 166 Boy: 81 Girl: 85 1st: 49 2nd: 30 3rd: 30 4th: 22 5th: 20 6th: 15

Oryadi-Zanjani (29)	Shiraz 2015	Total: 180 Boy: 95 Girl: 85 Preschool: 180	TOLD-3	-	Total: 11 Boy: 8 Girl: 3	Total: 9 Boy: 6 Girl: 3	Total: 20 Boy: 14 Girl: 6
Oryadi-Zanjani (30)	Shiraz 2015	Total: 183 Boy: 97 Girl: 86 Preschool: 183	TOLD-3	-	Total: 3 Boy: 2 Girl: 1	Total: 1 Boy: 1 Girl: 0	Total: 4 Boy: 3 Girl: 1
Mohamadi (24)	Shahrekord 2016	Total: 1387 Boy: 706 Girl: 681 Preschool: 1387	SSI-3 CAPE-V PPIT	Total: 30 Boy: 19 Girl: 11	Total: 186 Boy: 125 Girl: 61	Total: 21 Boy: 16 Girl: 5	Total: 237 Boy: 160 Girl: 77
Hatami (21)	Bushehr 2018	Total: 222 Boy: 112 Girl: 110 Preschool: 222	PPIT	-	Total: 21	-	Total: 21
Rezania (16)	Shiraz 2019	Total: 1588 Boy: 827 Girl: 761 Preschool: 1588	Townsville District Screening PPIT	Total: 53	Total: 635	Total: 200	Total: 888
Gholamiyan (25)	Mashhad 2022	Total: 2770 Boy: 1389 Girl: 1381 Preschool: 483 1st: 830 2nd: 865 3rd: 592	GRBAS SSI-4 PPIT	Total: 27 Boy: 22 Girl: 5 Preschool: 5 1st: 5 2nd: 4 3rd: 13	Total: 22 Boy: 14 Girl: 8 Preschool: 2 1st: 14 2nd: 2 3rd: 4	Total: 23 Boy: 18 Girl: 5 Preschool: 5 1st: 3 2nd: 5 3rd: 10	Total: 72 Boy: 54 Girl: 18 Preschool: 12 1st: 22 2nd: 11 3rd: 27
Aghaz (19)	Isfahan 2022	Total: 118 Boy: 59 Girl: 59 Preschool: 118	ISC-Persian ASQ	-	Total: 23 Boy: 14 Girl: 9	-	Total: 23 Boy: 14 Girl: 9

Abbreviations: NR: Not Reported, **ASQ:** Ages and Stages Questionnaire, **ICS:** Intelligibility Context Scale, **PPIT:** Persian Phonetic Information Test, **SSI:** Stuttering Severity Instrument, **CAPE-V:** Consensus Auditory-Perceptual Evaluation of Voice, **TOLD:** Test of language Development, **GRBAS:** the Grade Roughness Breathiness Asthenia Strain test

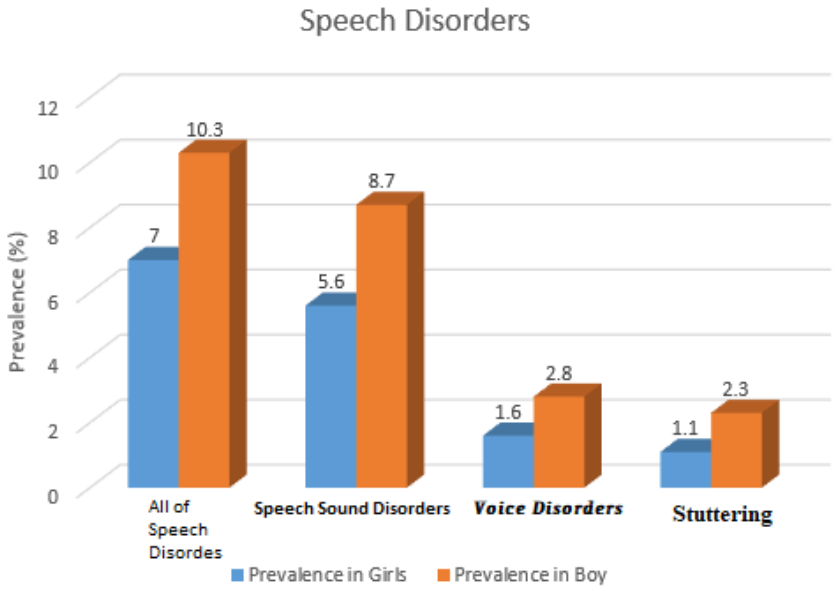

Figure-10: Comparison of the prevalence of Speech Disorders in girls and boys.

To calculate the prevalence of voice disorders in different grades, we included the results of 8 articles involving 17,130 preschool and elementary school students. The number of students in the preschool, first, second, third, fourth, and fifth grades was 3,458, 8,929, 1,063, 786, 201, and 199, respectively. The pooled prevalence of voice disorders in the preschool, first, second, third, fourth, and fifth grade Iranian preschool and elementary school students was estimated to be 2.2%, 1%, 1.2%, 2.4%, 3.5%, and 2%, respectively (Figure 9, Figure 11, and Table 3).

Significant heterogeneity was observed in most subgroup analyses ($I^2 > 85\%$, $p < 0.001$), indicating variability related to study methodology, diagnostic criteria, or wide geographic differences in Iran.

Table-3. Prevalence of different types of speech disorders and subgroup analysis based on random effects meta-analysis.

Variable			Number of Studies	Prevalence (95% CI), %	I^2	P-value	
						Q-test	Subgroup Difference
Speech Disorders	Gender	Boys	12	10.3% (7%-14.8%)	95.52	59.39	0.001
		Girls	13	7% (5-9%.8%)	92.36	68.2	
	Grade	Preschool	7	15.5% (4.3%-2.7%)	99.16	77.03	0.001
		1	6	10.1% (6.5%-15.4%)	94.56	59.21	
		2	6	7.1% (3.9%-12.6%)	91.55	67.67	
		3	5	8.7% (6.1%-12.2%)	77.36	29.3	
		4	4	9% (7.5%-10.8%)	90.50	64.3	
		5	4	8.1% (6.4%-10.1%)	97.67	91.96	
Speech Sound Disorders	Gender	Boys	7	8.7% (5.6%-13.4%)	90.16	59.5	0.001
		Girls	8	5.6% (3.7%-8.6%)	92.33	62.8	
	Grade	Preschool	7	5.4% (2.7%-10.6%)	95.51	58.22	0.001
		1	4	6.4% (3.1%-12.6%)	96.18	96.04	
		2	3	3.1% (0.8%-11.6%)	93.69	91.30	
		3	3	3.6% (1.2%-10.5%)	91.55	81.30	
		4	2	7.5% (5.9%-9.4%)	91.50	76.44	
		5	2	5.6% (2.7%-10.6%)	85.68	68.56	
Stuttering	Gender	Boys	7	2.3% (1.6%-3.2%)	89.05	98.8	0.001
		Girls	8	1.1% (0.6%-1.9%)	91.65	79.2	
	Grade	Preschool	5	2.5% (0.7%-8.9%)	96.98	23.6	0.001
		1	3	0.7% (0.3%-1.8%)	61.70	31.6	
		2	3	1.1% (0.2%-6.4%)	87.53	78.5	
		3	2	1.4% (0.5%-3.3%)	92.97	98.8	
		4	1	0.5% (0.1%-3.4%)	85.50	79.25	
		5	1	1% (0.3%-3.9%)	93.3	23.67	
Voice Disorders	Gender	Boys	4	2.8% (0.5%-15.6%)	94.88	45.36	0.001
		Girls	5	1.6% (0.4%-5.5%)	96.73	49.05	
	Grade	Preschool	3	2.2% (1.3%-3.7%)	76.93	86.27	0.001
		1	3	1% (0.3%-3.7%)	92.82	88.23	
		2	2	1.2% (0.2%-7.4%)	88.35	67.82	
		3	2	2.4% (1.6%-3.8%)	87.36	82.53	
		4	1	3.5% (1.7%-7.1%)	91.56	63.35	
		5	1	2% (1.3%-3.7%)	92.56	75.78	

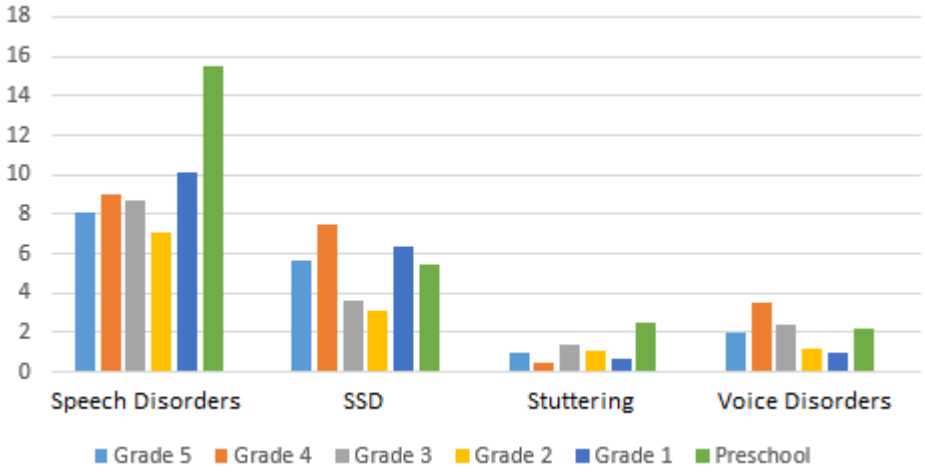

Figure-11: Comparison of the prevalence of Speech Disorders by grade.

3-4. Publication bias

In this study, the Egger's regression test was used to examine publication bias, and the results of our analysis showed significant publication bias (p = 0.04).

4- DISCUSSION

This systematic review and meta-analysis aimed to estimate the overall prevalence of speech disorders and subtype-specific among Iranian preschool and elementary school students from 2000 to July 2025. Based on data pooled from 15 eligible studies, the overall prevalence of speech disorders in Iran was estimated at 8.7%, which is roughly consistent with the estimate reported in the United States (7%) (11, 12). However it is lower than the estimates reported in Brazil (31.9%) (31) and higher than those in Australia (1.51%)(10) and India (3.8%)(32). The differences among these studies highlight the influence of methodological factors (such as tools and age of children) and socio-demographic factors. Given the wide variation in reported prevalence rates in Iran, this meta-analysis was conducted to provide an official rate of prevalence of speech disorders.

The main reasons for the high prevalence of speech disorders in children include nervous system disorders (24.6%), jaw and tooth problems (12.2%), hearing problems (5.9%), cleft palate (2.5%), and cleft lip (0.8%) (33). Nervous system disorders affecting speech in children include cerebral palsy (CP), genetic conditions (like Down syndrome), autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), and traumatic brain injuries (TBI) (34, 35). Furthermore, upon examining the results in Table 2 and Figure 2, it is evident that the prevalence rate of speech disorders is unfortunately increasing over time. Today, the main reason for this problem is the increased exposure of infants and children to digital devices (cellphones, televisions, and tablets)(36). Many children today use digital devices or are overexposed to them, which has many negative effects on their physical and mental health, including speech and language disorders and delays (37). Various studies have shown that more digital content is negatively associated with speech and language development. In order words, the more parents use digital devices during their child's daily activities, the more negative the impact on the child's speech and language development (36, 37).

The pooled prevalence of speech sound disorders (SSD) (7.15%), is lower than the estimates reported in Spain (51.4%) (5), and higher than the estimates reported in Pakistan (1.3%) (38) and Australia

(1.06%)(10). This wide and varied difference is often due to differences in diagnostic criteria. For example, in one study, the same disorder was assessed in the same group of students but with two different instruments, resulting in completely different results (39). Children with SSD usually have more social and educational problems compared to children with typical development (4, 19). Also, children with SSD are at higher risk for reading disabilities in school (40). Timely diagnosis and speech therapy for children of all ages play an important role in reducing complications from speech disorders.

The pooled prevalence of voice disorders (1.9%), is higher than the rate reported in Australia (0.12%) (10), and lower than the estimates in the US (3.9%) (41) and new findings from the US (6.7%) (42). In addition to different methodologies and diverse tools, these differences may be due to variations in the anatomy of the head and neck, larynx, and vocal cords of children of different ages (9). A study showed that intelligibility and pitch are speech variables that greatly affect teachers' perceptions of children's academic performance (43). Therefore, timely diagnosis and treatment of speech disorders are crucial for a child's future academic success. The pooled prevalence of stuttering (1.9%) estimated in this study is approximately consistent with the studies conducted in Egypt (1%) (7). It is higher than the reported rate in Australia (0.33%) (10), but lower than the reported rate in Ghana (2.77%) (6).

According to the results of this study, the prevalence of speech disorders and their types (SSD, stuttering, and voice disorders) is higher among boys than girls, which is consistent with the results of studies in other countries (5, 14, 16, 31, 32, 43), because the brain of boys is more vulnerable to many neurological injuries than that of girls (26). The results of one study showed that being male is a significant risk factor for speech and language disorders. In addition to being male, the child's age and the mother's advanced age were other significant risk factors, while not being bilingual had a protective role against speech and language disorders in children (44). Also, the results of a study on the Iranian children's community showed that being male, psychological causes, organic causes, family history, and the child's age had a significant relationship with the likelihood of speech disorders, but social causes, cultural factors, and birth order had no significant relationship (33).

The findings of this study have important implications. First, it is necessary to develop and implement national screening programs and diagnostic protocols at different ages (from one year of age to adolescence) for early identification of speech disorders in Iran. Second, it is necessary to provide appropriate training to teachers about signs of the types of speech disorders. Third, it is better to use public media to raise public awareness about paying attention to the symptoms of speech disorders at different ages in children and students.

The estimation of the prevalence of speech disorders by gender and educational level, as well as the inclusion of English and Persian texts, are strengths of this study. However, this study also had several limitations. First, the study did not include results from special schools and schools with special needs. Second, there were differences in the assessment tools used to determine the prevalence of speech disorders. Third, all of the reviewed studies were cross-sectional and relied on school students, ignoring students outside of school or alternative educational settings. Also, due to the inclusion of different age groups (from preschool to fifth grade), diagnostic and screening tools together, and languages and dialects of

different cities in Iran, the heterogeneity of the reviewed studies was high, but we did not perform meta-regression and sensitivity analysis. We recommend that future studies perform meta-regression and sensitivity analysis to address this problem. Another limitation of the present study was the lack of prospective registration of the review protocol in PROSPERO prior to conducting the study; however, all methodological procedures were predefined and the study was conducted in accordance with the PRISMA guidelines.

5- CONCLUSION

This systematic review and meta-analysis provide the first and most comprehensive estimate of the prevalence of speech disorders and their subtypes among Iranian preschool and primary school children. The results of this study show that one in ten school-aged children suffers from some type of speech disorder, with a higher prevalence rate in preschool children. Given the high prevalence of speech disorders, there is an urgent need for national policies for screening at different ages, increasing awareness, and implementing early intervention. Timely speech therapy plays a crucial role in reducing complications from speech disorders. Further high-quality, large-scale studies are needed to better understand the prevalence rate of speech disorders in Iran.

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