Research Article

Scarcity of Research on Autism in Children in Asia

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Abstract

Background:

Autism spectrum disorders (ASD) constitutes a diverse group of conditions related to the development of the brain. It is uncertain how prevalent ASD is in various Asian nations. The goal of our study is to evaluate the breadth of the problem as well as the lack of understanding regarding ASD in Asia.

Methodology:

We looked for, gathered, and assessed literature that reported the prevalence of ASD in eight Asian nations between 2019 and September 2022. The search was carried out in accordance with PRISMA standards.

Results:

We identified nine articles from Oman, Qatar, India, Israel, Saudi Arabia, Japan, China, and Korea that met our predefined inclusion criteria. The reported prevalence of ASD in Asia ranged from 0.29% in China t.14% in Qatar to 3.22% in Japan. Prevalence varied substantially across different geographic areas in Israel. The prevalence of ASD in two cities of Saudi Arabia was 2.81 per 1,000 children while in India 2.25 per thousand and 20.35 per 10,000 children in Oman. In Korea, the prevalence was found to be 5.2 per 1,000 births and 9.4 per 1,000 births in 2002 and 2012 respectively. Study sample sizes ranged from 1023 in Saudi Arabia to 1,786,194 in Israel. The targeted age range was 2 and 12 years. No studies were found that reported the prevalence of ASD in other Asian countries. Due to methodological heterogeneity, the review was descriptive, and the data retrieved from the selected studies were summarized but not statistically merged, in accordance with PRISMA.

Conclusion:

This research will contribute to the evidence found that will be utilized to plan future research and make policy decisions in this region. Knowing the prevalence of ASD in Asia is essential for allocating resources and services appropriately.

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INTRODUCTION:

Autism remains a fascinating illness, with the concept and description of the disorder changing dramatically over time (1). Autism is a disorder that affects the developing brain and is characterized by a complex, behaviorally defined static malfunction. We refer to autism (the autistic spectrum disorders [ASDs]) as a broad range of developmental disorders marked by deficits in three behavioral domains: 1) social interaction; 2) language, communication, and imaginative play; and 3) a wide range of interests and activities (2). During the last decade, there has been a dubious increase in the prevalence of autism spectrum disorder (ASD) diagnoses around the world. In Asia, the overall prevalence of ASD is 0.36 percent and it is still rising (3). East Asia has a greater prevalence of ASD (0.51 percent) than West Asia (0.35 percent) or South Asia (0.31 percent)(3). The prevalence, specific targets, and time-bound comparison of the incidence of ASD in many Asian countries are still unknown. The study aims to highlight the current prevalence of Autism in Asia, the populations at risk, and the factors contributing to the incidence. We looked for, gathered, and analyzed literature about the prevalence of ASD in Asian nations published between 2019 and 2022. The search was carried out in accordance with PRISMA rules.

In China, the ASD prevalence rate for the general population was 0.29 percent (4). Boys had a greater prevalence than girls (4). The bulk of the 363 confirmed ASD patients (90.4 percent) were newly diagnosed, with 43.3 percent attending traditional schools (4). In India, a study from the rural setting revealed a prevalence of 0.11 percent in children aged 1–18 years, while four studies from the urban setting revealed a prevalence of 0.09 percent in children aged 0–15 years(5). The frequency of ASD was estimated to be 1.07 percent in Sri Lanka (6). In Dhaka city, an alarmingly high frequency (3%) was recorded (6). The ages of the participants ranged from 1 to 30 years old (6). In Pakistan, there have been several studies on autism. Sarwar et al., 2009 showed an incidence of 4.5% with a male-female ratio of 2:1 in Karachi (7). Another hospital-based study by Imran et al., 2012 showed an incidence of 3.2% with a male-female ratio of 2:1 in Lahore (7). There were no significant studies found in all 48 countries of Asia that documented the prevalence of ASD. Autism rates are skyrocketing as a result of increased awareness and screening, improved access to healthcare, and expanded diagnostic criteria.

Our research aims to determine the scope of the problem and the scarcity of knowledge about ASD in Asia. This study will add to the evidence database that will be used to design future research and make policy decisions in this region. Knowing the incidence of ASD in Asia is critical for appropriate resource and service allocation.

METHODS:

Definition of ASD:

For this review, we used the World Health Organization's (WHO) definition of ASD. Autism – also referred to as autism spectrum disorder –

"constitutes a diverse group of conditions related to the development of the brain" (8). Autism is characterized by some degree of difficulty with social interaction and communication. Other characteristics are atypical patterns of activities and behaviors, such as difficulty with the transition from one activity to another, a focus on details, and unusual reactions to sensations

Search Strategy:

The search approach adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist (9) and the PRISMA guidelines were followed throughout. An extensive systematic search of four electronic databases; PubMed, Medline, Hinari, and the Cochrane Library was undertaken. Studies are done between 2019 and September 2022 were selected.

A combination of the following terms was used for the search:

> **Category 1:** Population (Asia, children)
>
> **Category 2:** Disease (Autism, Autistic Spectrum Disorder, Autistic Disorder, Asperger Disorder, and Rett's syndrome)
>
> **Category 3:** Prevalence of Epidemiology

With the search criteria mentioned above, a new search was run for each country in Asia one by one. Additional publications were found by manually searching the reference lists of these researchers. The citations found in the search results were downloaded to the Endnote reference management software version X20.0 and duplications were removed. Initially, the articles were reviewed on the basis of title and abstract followed by full article reviews.

Inclusion Criteria:

Articles were included based on the following criteria: a) Studies focused on children aged 2 to 12 years. b) Individual studies with original data including gray literature c) Defined diagnostic criteria stated for autism or autism spectrum disorders d) Prevalence e) Studies which were available in English language or could be translated to English language f) Geographically defined population that is Asian residents g) Studies done between 2019 and September 2022. Articles were excluded based on a) Studies that weren't extractable b) Editorials, reviews, and commentaries c) Qualitative studies d) studies that weren't of interest.

Quality Assessment:

Each paper was initially screened and analyzed separately by two authors (AH & AA) before being included or excluded. Articles were further evaluated by other four authors (AS, AT, AK, and AW) to see whether they met the inclusion and exclusion criteria. AU, AS, AR, and AS closely examined and made recommendations for improving the review process. The titles and abstracts of each publication were initially reviewed to see if the selection criteria were met. The complete text of any articles that didn't fit these requirements wasn't obtained and was excluded. When there was a difference of opinion about the eligibility, the four authors (AS, AT, AK, and AW) reasoned and decided whether or not to include or exclude that specific article.

Additionally, the included studies were assessed for quality by The Joanna Briggs Institute (JBI) critical appraisal tools for prevalence studies (10). All studies that fulfilled the eligibility criteria were included in the review regardless of their quality assessment results. A detailed assessment of the included articles is shown in table 1. Following were the results for the mentioned 9 studies: 6 (66.67%) were of very good quality, 1 (11.11%) was of good quality, 1 (11.11%) was of average quality and 1 (11.11%) was of poor quality.

Table 1

Author	Joanna Briggs Institute Score	Was the sample frame appropriate to address the target population?	Were study participants sampled appropriately?	Was the sample size adequate?	Were the study subjects and the setting described in detail?	Was the data analysis conducted with sufficient coverage of the identified sample?	Were valid methods used for the identification of the condition?	Was the condition measured in a standard, reliable way for all participants?	Was there an appropriate statistical analysis?	Was the response rate adequate and if not was the low response rate managed appropriately?
Priti Arun et al.	9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hadas Magen-Molho et al.	9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Manabu Saito et al.	9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hao Zhou et al.	5	No	No	No	Yes	Yes	Yes	No	Yes	Yes
Xiang Sun et al.	4	No	No	No	Yes	No	Yes	No	Yes	Yes
Wafa Al-Mamri et al.	8	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fouad Alshaban et al.	9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Heba J.Sabbagh et al.	9	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Seung-Mi Yoo et al.	9	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Tabulation:

After full-text examination, data were extracted and tabulated by a) author name b) year of publication c) journal name d) country e) setting f) population size g) male/ female h) study design i) outcome measures j) age ranges k) prevalence l) main

findings as shown in table 2. All rejected studies were listed together with the reasons for exclusion. The method used for selecting the articles is shown in fig 1.
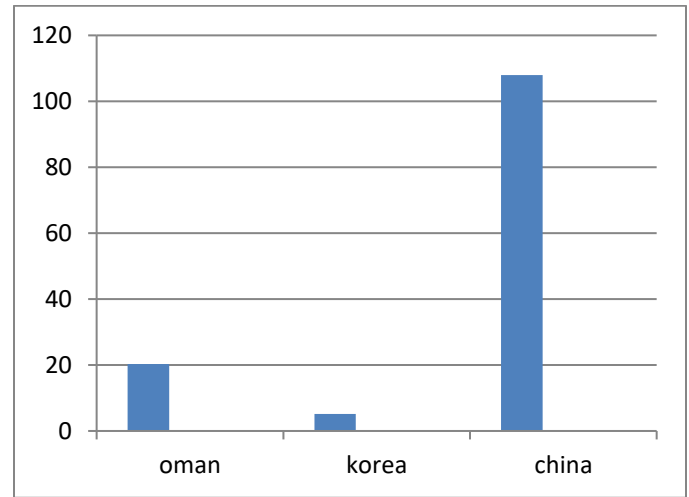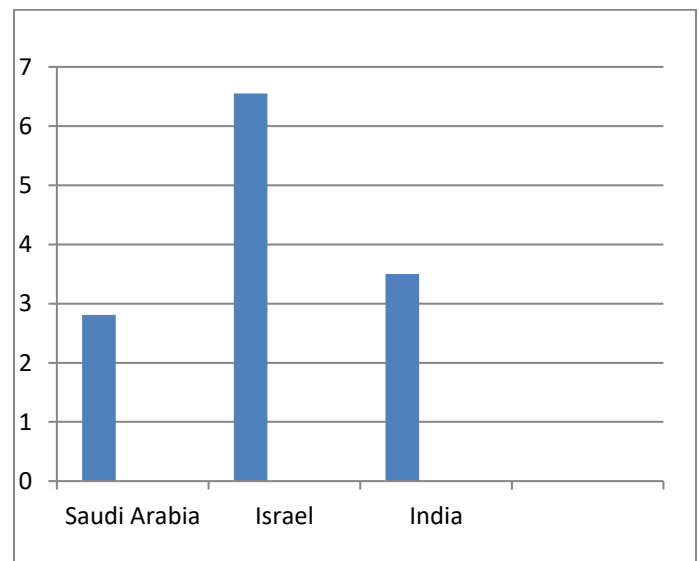
RESULTS:

Selection of literature:

We found 338 articles from the initial database search. 201 articles were removed as duplicates. 128 publications were eliminated after being compared to the inclusion criteria in their titles and abstracts and found to be irrelevant to the review, and papers were then picked for close consideration. The remaining 9 studies underwent eligibility testing and were incorporated into the review, as depicted in fig 1

Fig 1

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

Prevalence of ASD in South Asia:

Table 1 presents a summary of the seven community based and two hospital-based studies that reported the prevalence of ASD; two studies from China (17,19), one from Oman, Qatar, India, Israel, Saudi Arabia, Korea, and Japan each (11-16,18). Study sample sizes ranged from 1023 in Saudi Arabia to 1,786,194 in Israel. However, there was a wide variation of screening and diagnostic instruments among these studies. The following generalizations were made:
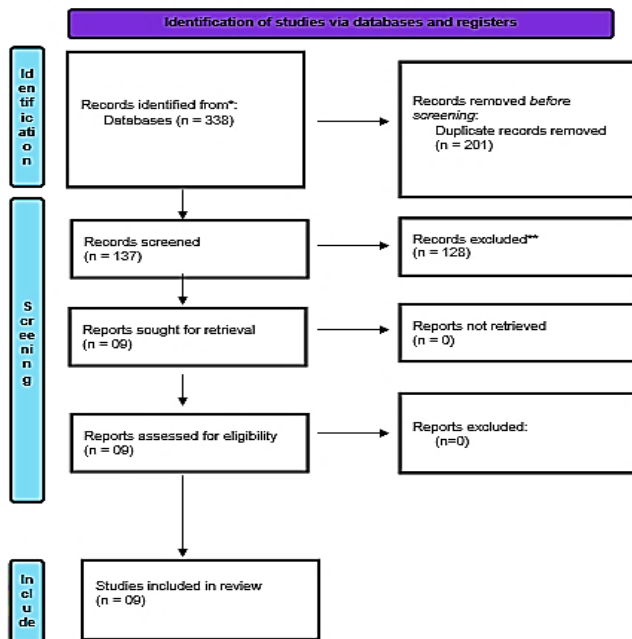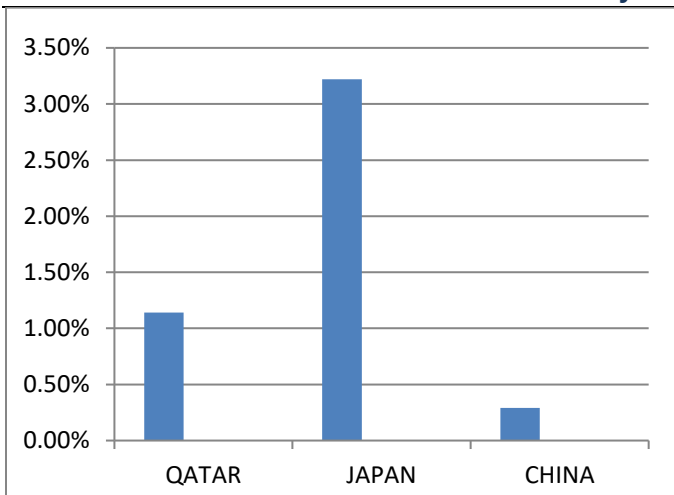

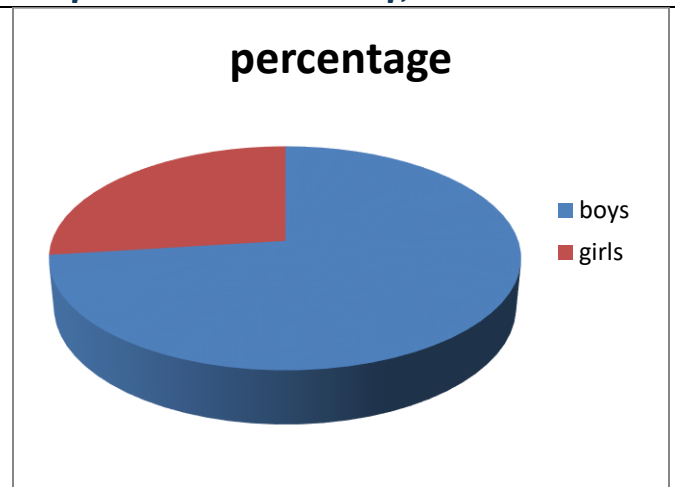(Prevalence rates/10000)


(Prevalence rates/1000)

(Prevalence rates/10000)

percentage

(SAUDI ARABIA)

In Qatar, the prevalence was 1.14% (95% confidence interval [CI]: 0.89-1.46) among children aged 6 to 11 years old (11). ASD prevalence was found to be 2.25 per thousand (95% confidence interval (CI) 0.69-5.19) in Chandigarh, India. Boys and girls had a prevalence rate of 2.24/1000 and 2.26/100, respectively (12). According to a study conducted in Israel, there are significant regional variations in the frequency of ASD, with central Israel having a disproportionately greater prevalence. Compared to Jewish locations, Arab localities had a much lower prevalence, while being a mixed locality was associated with an intermediate prevalence (13). According to a research group, Jeddah had a prevalence of ASD of 2.618 per 1,000 children, Makkah had a prevalence of 3.68 per 1,000 children, and Jeddah and Makkah both had a prevalence of 2.81 per 1,000 children (14). 20.35 per 10,000 children in Oman were confirmed to have ASD. ASD prevalence was 3.6 times higher in males than in females. Compared to children aged 5 to 9 (20.2/10,000) and children aged 10 to 14, it was greater among children under the age of five (30.34/10,000)(15). Japan's overall ASD prevalence was calculated to be 3.22%. For boys and girls, respectively, the adjusted prevalence of ASDs was 4.06% and 2.22% (16). According to a study done in several Chinese cities, JHILIN, SHENZEN, and JIAMUSI had the highest prevalence of ASD at 108/10000, 42.3/ 10000 , and 19/10000, respectively(17).According to a nationwide study on ASD was out in Korea, the prevalence was 5.2 per 1,000 births in 2002 and 9.4 per 1,000 births in 2012(18). In China, a large-scale study found an incidence of 0.29%, with boys having a higher prevalence than girls (19).
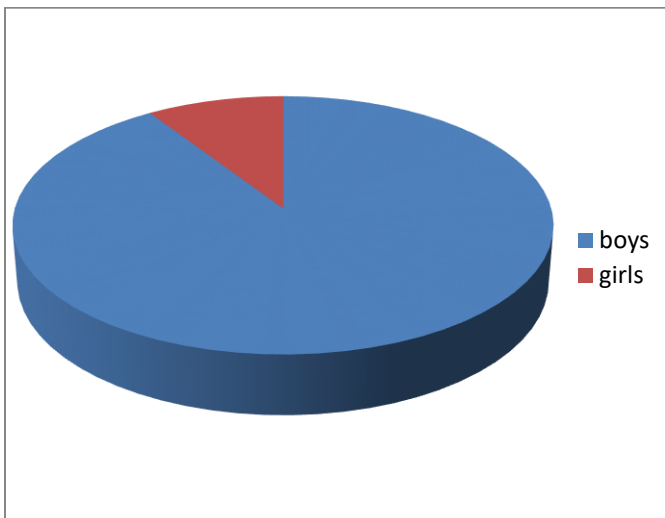
(Oman- 31.23/10000 boys, 9.07/10000 girls)
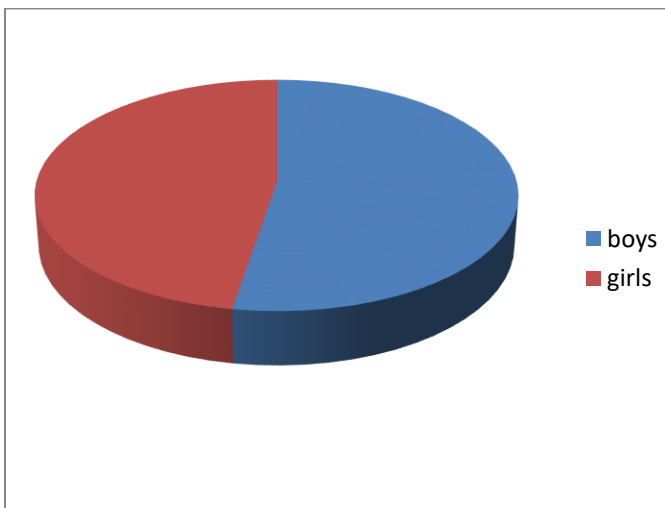
(Chandigarh, India-52.63 boys, 46.36 girls)

Author Name	Year of Publication	Journal Name	Country	Setting	Population size	Male/ Female	Study design	Outcome measures	Age ranges	Preva-lence	Main finding
Watfa Al-Mamri,1 *Ahmed B. Idris,1 Samar Dakak,.et.al	2019	Sultan Qaboos University Med J,	Oman	Hospital Autism diagnostic centers	(N = 1,705).	Males & females	Retrospective descriptive study	DSM -5	0-14 y	20.35 per 10,000 children	The highest prevalence is in the capital Muscat (36.51%) Boys were found to have a 3.4-fold higher prevalence of ASD than girls (31.23/10,000 versus 9.07/10,000).
Fouad Alshaban,1 Mohammed Aldosari,2 Hawraa Al-Shammari, et al.	2019	Journal of Child Psychology and Psychiatry	Qatar	Community	N = 176,960)	Male & female	cross-sectional survey	QCC-AF QSS-PTI SCQ	6- to 11y	1.14%	The prevalence of autism is more among consanguinity
Priti Arun & Bir Singh Chavan	2019	Indian J Med	Chandigarh, India	community	8400.	Male& female	cross-sectional two-stage survey using random sampling technique,	(CASI) DSM-5	1.5 and 10 yr.	2.25 per 1000	Male (52.63%) female (47.36%)
Xiang Sun, Carrie Allison, Liping Wei,	2019	Molecular Autism	China	Community-based	7258,	Males & females	Cross-sectional	CAST DSM-IV-TR/DSM-5	6-10 y	108 per 10,000	
Xiang Sun, Carrie Allison, Liping Wei,	2019	Molecular Autism	China	Community-based	7258,	Males & females	Cross-sectional	CAST DSM-IV-TR/DSM-5	6-10 y	108 per 10,000	
Seung-Mi Yoo ,Kyoung-Nam Kim ,Sungchan Kang	2022	J Korean Med Sci.	Korea	Community	4,989,351	Male and female	The retrospective birth cohort study	ICD-10 CD-10 codes F84.0, F84.1, F84.5, F84.8, or F84.9	0-8 y	5.2 /10,000	The ASD prevalence was 2.7 times higher among boys than girls

Hao Zhul, Xiu X, Weili, Yanet. al	2020	Neurosci Bull.	China	Community	(n=125,806)	Male and female	Multi-stage Convenient Cluster stamping	MC-ASRS)	6-12y	0.29%	The prevalence was significantly higher in boys than in girls (0.95%; 95% CI: 0.87%–1.02% versus 0.30%; 95% CI: 0.26%–0.34%; P\0.001).
Hadas Magen-Molho, Ruthie Harari-Kremer,Ofir Pinto, . et al.	2020	Ann Epidemiol.	Israel	community	(N=1,786,194),	Males & females	Cohort study with prevalence-mapping	DSM-IV-TR criteria used by NII	1 -16 y	6.55 per 1000; 1 in 153)	ASD prevalence varies substantially across different geographic areas in Israel,
Heba J. Sabbagh,Basma A. Al-Jabri,Malek A. Alsulami, et al	2021	Saudi Med J	Saudi Arabia	Hospitals and schools	1,023	Males & females	Cross-sectional study	MHRSD database	12 years	2.81 per 1,000	there was a statistically significant relationship between severe ASD and ASD family history
Manabu Saito, TomoyaHirota,, Yui Sakamoto,	2020	Molecular Autism	Japan	Community-based	3954	Males & females	Cross-sectional study	(ASSQ), (SDQ), (ADHD-RS-IV),(DCDQ) PSI (WISC-IV) MABC-2) DSM-5	5 year old	3.22%	The male-to-female ratio of the crude prevalence was 2.2:1.

Table 2 Summary of epidemiological studies on ASD in Asia

DISCUSSION:

During the last decade there has been a dubious increase in the prevalence of autism spectrum (ASD) diagnoses around the world. Most of this work has been done in the west. There is a significant lack of information about the prevalence of autism in Asia. This systematic review collects all the data on the prevalence of autism spectrum disorder in Asia and includes journals that have matched the outcome results of our topic. A total of 338 articles were found that reported prevalence in different countries of Asia. This included all the articles published between the years 2019 -2022. After screening using our inclusion and exclusion criteria according to PRISMA guidelines, 9 articles were finally selected. This included 2 articles from China (17, 19) and one article each from Oman, Qatar, India, Israel, Saudi Arabia, Korea, and Japan (11-16,18).

In 2019 a study was conducted in Oman with a population sample of 1705 individuals ranging from age 0-14 years and the highest prevalence was found in Mascat (15). Boys were found to have a 3.4-fold higher prevalence of ASD than girls. The prevalence was found to be 15-fold higher since 2011 estimates. It was due to improvements in screening programs and diagnostic criteria. ASD is not linked to geographical or political boundaries unless it is linked to genetic and environmental factors. In Qatar, a population sample of 176,900 people was taken and the prevalence was found to be 1.14 % (11). It had two components a school component uniquely due to newly diagnosed cases accounting for 28.1% of overall prevalence. In India cross-sectional study was conducted having a population size of 8400 individuals and the prevalence was found to be 2.25/1000 people with a rate of 52.63% in males and 47.56% in females (12). It was a population-based study having a sufficient sample size and a low response rate. Indian scale for assessment of autism was used for assessment of disability in autism. In a study from Kolkata scales used were translated from western scales. The study looked at cases below cut off on screening tools to find out false negative results. At last, the study used the PPS method for sample size and stratified random sample technique to have a representative sample from rural and urban areas. In Israel, a cohort study was conducted using DSM-TR criteria and the prevalence was 6.55% but it varies among different regions of Israel (16) . High SES localities report a higher prevalence than those of their sub-district localities. This pattern of higher prevalence in central areas seems to be steady over years. Arab localities were found to have a three-fold lower prevalence mixed ones have intermediate and Jewish localities have a higher prevalence. This may indicate lower awareness or acceptance of mild cases of ASD in the Arab population. Health services seem to be centered more in central areas than in peripheral localities. In Saudi Arabia prevalence was found to be 2.81/1000 people in children aged 6-12 years attending schools at rehabilitation cents in Makkah and Jeddah (14). The increased prevalence is associated with some genetic and environmental factors. In Saudi Arabia the rate of cousin marriage is high. In Japan cross-sectional study was conducted

on a group of 3954 individuals with a prevalence of 3.22% over the age of 4 years. The male and female ratio was found to be 2.2 in the total study population (16). 30% of children with ASD have not been identified as developmentally challenged and have not received services and interventions. This study describes high rates of co-occurring NDDs. In China prevalence was found to be 108 /1,00,000 using CAST DSM criteria(17). In Korea, the prevalence was 5.2/10000 and it was 2.7 times higher in boys than girls (18). In China again a study was conducted using cluster sampling and prevalence was significantly higher in boys than in girls (19). The population sample was children between the ages of 6-12 years. The estimated prevalence was 0.70%.

Limitations:

Different screening and diagnostic tools were used to find out the prevalence in different countries which makes it difficult to compile and compare the data. Google Scholar is not used for this review so there is a possibility that some of the articles may not be included. Prevalence is not universally calculated because population size is hospital-based or consists of school populations.

Strengths:

Data from 8 different countries were included in this systematic review which makes it able to generalize it.

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