Breastfeeding and Its Relation with Autism Spectrum Disorder in Children

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ABSTRACT

Background: The causation of autism spectrum disorder (ASD) is uncertain, in spite of the fact that the influence of genetic and environment related influences for sure to play a principal function in the series of action. **Study objectives:** to investigate the strength of association between autism and maternal breastfeeding in affected children. **Subjects and Methods:** A community-based case control study was carried out in Riyadh, Saudi Arabia, during the period from 1 August to 31 September, 2021. A convenience sample of 102 autism child from different areas of Saudi Arabia and 100 matched control child were included in the study. A predesigned questionnaire was filled only by the parents of autistic children and normal children. **Results: the majority (**59.8%) of the mothers of autistic children and 62% of the mothers of the control children were early breastfed (P value <0.05). Child bottle-feeding was found in 78.4% of the autistic children and 74% of the control (P value >0.05). The number of autistic children who were never breastfed was significantly higher than non-autistic children. Most (64.7%) of our studied autistic children were females. **Conclusion:** The majority of the mothers of autistic children were early breastfed but they took breast feeding for less than 6 months. The majority of autistic children received colostrum during 1st two weeks after birth, but less than half were exclusively breastfed, and only small number had completed duration of breastfeeding. Pregnant mothers should be educated about the importance of breastfeeding for prevention of ASD.

Key words: Autism spectrum disorder, Breastfeeding, Children

INTRODUCTION

Autism is a common condition in infants and children with an assessed prevalence reaching between 20.0 and 116.1 per 10 000 people [1,2]. Autism was primarily pronounced in 1943, as a multifaceted developmental condition categorized by plain deficiency in mutual communal communication and interactions and by a pattern of repetitive or stereotyped behavior and individuals diagnosed with autism typically have problems of the presence of repetitive and restricted patterns of behaviors [3]. Autism is associated with substantial lifetime healthcare cost, alongside multiple social, academic, and occupational adversities [4].

Autism is a behaviorally definite condition, but it is caused by a number of several known and unknown biologically based brain dysfunctions that disturb the development of brain's capacity to handle information, and recently researches suggests that cases with ASD do not respond to emotional signals in human social communications because they may not pay attention to the social cues that others typically notice and it's usually hard for others to understand the body language of children with ASD [5].

The neurobiological etiology of autism was thought to include, at least partially, an imbalance of some factors like dopamine, glutamate, and acetylcholine [6]. Some recent studies have suggested that the early-life environmental factors like: maternal metabolic syndromes during pregnancy, exposures to viral and bacterial infections, air pollution, exposure to various medications and nutritional deficiency can play a significant role in the risk of autism [7].

The prevalence of ASD has a noticeable increase in the past two decades [8]. The current prevalence of ASD in the latest large-scale surveys is about 1%-2% [9,10]. In spite of the increase in prevalence is partially as a result of changes in Diagnostic and Statistical Manual of Mental Disorders (DSM) diagnostic criteria and younger age of diagnosis, an increase in risk factors cannot be neglected [11,12]. Also some previous studies ensure a male preponderance, as they reported that autism disturbs males than females [9,10,13]. This indicative prejudice on the way to men might be the consequence of a nonexistence of cognizance of women with autism [11]. In addition, some researchers suggest the possibility of a female-specific protective effect on autism [12].

Evidence suggests that the nutritional status of the newborn, particularly the duration of breastfeeding, plays a key role in the pathogenesis of autism spectrum disorder. Several studies have reported contradictory results regarding the link between autism and breastfeeding. They investigated the association between ASD and breastfeeding initiation and duration in the Early Development Research Study, a community-based case-control study at six sites in the United States [13]. In another previous study done in Lebanon, they reported a rising in autism prevalence whereas breastfeeding is declining [14].

Ghozy *et al.* [15] performed and reported a systematic review, dose-response analysis, and meta-analysis to systematically review the findings of studies on the relationship between autism spectrum disorders and breastfeeding patterns and to meta-analyze related studies. 58 "Continued breastfeeding increases risk of autism spectrum disorder and 76" exclusively breastfeeding increases risk, breastfeeding for 6 months reduced risk 54%, breastfeeding for 12-24 months reduced risk of autism spectrum most significantly associated obstacle [15].

Soke *et al.* conducted [13] a community-based case-control study in six sites in the Unites States to

Received: 29/9/2021
Accepted: 27/11/2021

explore associations between ASD and breastfeeding initiation and duration and reported that; association of ASD and breastfeeding duration was slightly attenuated when the presence of the broader autism phenotype (BAP) in the mother was accounted for, but still remained for the highest tertile. This association does not appear to be totally explained by maternal BAP [13].

Another systematic review and meta-analysis established that; children with ASD, whichever in the form of medical finding or self-report, were suggestively less probable to be breastfed than children destitute of ASD (P = 0.002). Subcategory analyses discovered that outcomes persisted substantial for breastfed children with added supplementation [16].

AIM OF THE STUDY

This study aimed to decide the strength of association between autism and maternal breastfeeding; duration and initiation, in affected children in KSA.

Study hypothesis:

There is a strong association between autism in children and maternal breastfeeding initiation and duration.

Study question:

Is there any association between autism in children and maternal breastfeeding initiation and duration?

MATERIALS AND METHODS

Study design and setting:

A community-based case control study, carried out in Saudi Arabia, during the period from 1 August to 31 September, 2021.

Sampling:

A convenience sample of 102 autism child from different areas of Saudi Arabia and 100 matched control child were included in the study.

Inclusion criteria:

The questionnaire was filled only by the parents who had a child diagnosed with autism, aged 3-10 years of both sexes, whose diagnosis was confirmed by DSM-5 criteria [17]. Another about equal number of the same questionnaires were filled by parents of a normal children.

Exclusion criteria: Autistic children who had deafness, congenital malformations and aged above 12 years old.

Data collection technique:

Data were collected using a self-administered, online disseminated questionnaire. The researchers spread the questionnaire online and through social networking sites (WhatsApp, Facebook, Twitter). The form had a short introduction clarifying the objectives of the research and secrecy of the information.

Pilot study:

A pilot study was steered on 20 parent of targeted children to exam the questionnaire's simplicity and meaning, the time desired to reply wholly questions, and test consistency. They were excluded from the data analysis.

Data collection tool:

Questionnaires were designed literally by the researchers of the study.

The questionnaire included questions about age, gender, type of residency, social status, and average monthly income. The second part of the questionnaire focused on relation of autism and maternal breastfeeding. The third part of the questionnaire was filled by the families who had a child diagnosed with autism, including questions about the child's sex, current age, age at diagnosis, and parent's age during child birth.

Ethical considerations:

Approval obtained from the Research Ethics Committee of the King Fahad Medical City, Riyadh, KSA. Data were anonymous for patient confidentiality. Use of these anonymous data in this research project was reviewed and approved by the Research Ethics Committee. The collected data were kept safely in a password protected computer. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Data management and Statistical analysis:

The collected data were entered then were analyzed using the Statistical Package for the Social Sciences (SPSS Inc. Chicago, IL, USA) version 23. Data were presented as frequency and percentage and were compared by chi^2 test. $P<0.05$ was considered significant.

RESULTS

Mother age during pregnancy of the autism child was 30 - 40 years in 29.4% and 56% of the control group and more than 40 years in 4.9% and 3% of the control ($P>0.05$). 24.5% of the studied mothers of the autism children and only 18% of the mothers of the control children reported frequent use of paracetamol during pregnancy ($P>0.05$). 14.7% of the studied mothers of the autism children and only 8% of the mothers of the control children reported frequent use of drugs during pregnancy (Table 1).

Table (1): Mother age during pregnancy of autistic children and use of paracetamol during pregnancy

Variables	Autistic children (n=102)		Non autistic children (n=100)		P value
	(No.)	(%)	(No.)	(%)	
Mother age during pregnancy					
< 20	15	14.7	20	20.0	0.402
20 - 29	52	51.0	56	56.0	
30 - 40	30	29.4	21	21.0	
> 40	5	4.9	3	3.0	
Frequent use of paracetamol during pregnancy					
Yes	25	24.5	18	18.0	0.258
No	77	75.5	82	82.0	
Frequent use of drugs during pregnancy					
Yes	15	14.7	8	8.0	0.134
No	87	85.3	92	92.0	

Table (2) shows breastfeeding related characteristics among participants. 59.8% of the mothers of autistic children and 62% of the mothers of the control children were early breastfed (P value <0.05). 40.2% of the autistic cases and 38% of the control group took breast feeding for less than 6 months (P value > 0.05) 71.6% of autistic children and 78% of the control children received colostrum during 1st two weeks after birth (P value > 0.05). 43.1% of autism cases and 34% of the control group were exclusively breastfed (P value >0.05), and only 15.7% of autism cases and 34% of the control children had completed duration of breastfeeding (P value >0.05). Child bottle-feeding was found in 78.4% of the autistic children and 74% of the control (P value >0.05). The number of autistic children who were never breastfed was significantly higher than non-autistic children.

Table (2): Shows breastfeeding related characteristics among participants

Variables	Autistic children (n=102)		Non autistic children (n=100)		P value
	(No.)	(%)	(No.)	(%)	
Initiation of breastfeeding					
Early	61	59.8	62	62.0	0.024
Late	6	5.9	16	16.0	
Never	35	34.3	22	22.0	
Child received colostrum in 1st two weeks after birth					
Yes	73	71.6	78	78.0	0.293
No	29	28.4	22	22.0	
Exclusive breastfeeding					
Yes	44	43.1	34	34.0	0.182
No	58	56.9	66	66.0	
Duration of breastfeeding:					
< 6 months	41	40.2	38	38.0	0.199
6 - 12 months	15	14.7	15	15.0	
13 - 18 months	10	9.8	18	18.0	
19 - 24 months	20	19.6	22	22.0	
> 24 months	16	15.7	7	7.0	
Cause of incomplete breastfeeding (N=86)					
Mother work	21	24.4	41	41.0	0.075
Mother illness	12	14.0	8	8.0	
Child illness	4	4.7	2	2.0	
Other causes	49	57.0	49	49.0	
Child bottle-feeding					
Yes	80	78.4	74	74.0	0.459
No	22	21.6	26	26.0	

Most of our studied autistic children were females (64.7%). 49.0% were 24 months or younger at diagnosis of autism. Mother's educational level was university or higher in 64.7% of cases. Obesity of mother during pregnancy was seen in 18.6% of the mothers of autistic children. 55.9% of participant mothers did not use any vitamin D supplement during pregnancy (Table 3).

Table (3): Sociodemographic characteristics of studied autistic children, obesity of mother during pregnancy and use of vitamin D supplement during pregnancy (N=102)

Variables	Frequency	Percent (%)
Child sex		
Male	36	35.3
Female	66	64.7
Child age at diagnosis of autism (in years)		
≤ 2	50	49.0
2-3	44	43.1
> 3	8	7.8
Nationality		
Saudi	97	95.1
Non-Saudi	5	4.9
Mother's education		
Introductory or less	12	11.8
Secondary school	24	23.5
University or higher	66	64.7
Mother's work		
Working mother	44	43.1
Housewife	58	56.9
Average monthly income of the family		
Low (≤2000 SAR)	14	13.7
Normal (2000-10000 SAR)	39	38.2
High (≥10000 SAR)	49	48.0
Obesity of mother during pregnancy		
Yes	19	18.6
No	83	81.4
Use of vitamin D supplement during pregnancy		
Yes	45	44.1
No	57	55.9

DISCUSSION

The causation of autism spectrum disorder is uncertain, in spite of the fact that the influence of genetic and environment related influences are sure to play a principal function in the series of action [19]. Preconception folic acid dietetic supplements were related to a reduced hazard of ASD. Certain links with air pollution and motherly stressors at specific period in being pregnant were established, nevertheless variable consequences through international localities make the interpretations difficult. Suggestions of ASD and immunizations were required to be studied carefully [19,20]. The current study is a community-based case control study, carried out in Saudi Arabia, to determine the strength of association between autism and maternal breastfeeding in affected children. Numerous risk influences for ASD were proposed. Several systematic reviews and meta-analyses designated antenatal and perinatal issues, maternal issues, and nutritional and daily life influences were referred to [19].

In the current study, mother age during pregnancy of the autism child was 30 - 40 years in 29.4% and 56% of the control group and more than 40 years in 4.9% and 3% of the control (P>0.05). Another study reported that motherly age (≥40 years) and fatherly age (≥50 years) were unconventionally linked with ASD risk in a number of researches [20].

In our study, obesity of mother during pregnancy was seen in 18.6% of the mothers of autistic children. Non-precise non-ideal aspects throughout pregnancy, comprising motherly metabolic circumstances and weightiness gain, have correspondingly been concomitant with a somewhat amplified hazard of ASD and development interruption [21]. In the present study, 55.9% of participant mothers did not use any vitamin D supplement during pregnancy. This is comparable with findings of another study; motherly vitamin D shortage has been accompanying an augmented hazard of ASD occurrence in children [22].

In the present study, 24.5% of the studied mothers of the autism children and only 18% of the mothers of the control children reported frequent use of paracetamol during pregnancy (P>0.05). 14.7% of the studied mothers of the autism children and only 8% of the mothers of the control children reported frequent use of drugs during pregnancy. A number of studies have well-thought-out motherly medicine use throughout pregnancy [23]. Prenatal valproic acid administration was concomitant with augmented risk of ASD [8]. For antidepressants, comprising selective serotonin-reuptake inhibitors, additional studies recommended no strong risk, regardless of former worries [9,10].

In the present study, 59.8% of the mothers of autistic children and 62% of the mothers of the control

children were early breastfed (P value <0.05), 43.1% of autism cases and 34% of the control group were exclusively breastfed (P value >0.05), 15.7% of autism cases and 34% of the control children had completed duration of breastfeeding (P value >0.05) and the number of autistic children who were never breastfed was significantly higher than non-autistic children. A previous study in Lebanon reported a rising in autism prevalence as breastfeeding is deteriorating [14]. A meta-analysis was reported that; 58 % decrease in the risk of autism spectrum disorder with ever breastfeeding and a 76 % decrease in the risk with exclusive breastfeeding [15]. Most (64.7%) of our studied autistic children were females. Evidence suggests male preponderance; ASD disturbs males more than females 2-3 times. This indicative bias may come from under reporting of females with autism [27]. Similarly, particular investigators have advised the likelihood that female related protecting properties against ASD may occur [11].

CONCLUSION

The majority of the mothers of autistic children were early breastfed but they took breast feeding for less than 6 months. The majority of autistic children received colostrum during 1st two weeks after birth, but less than half were exclusively breastfed, and only small number had completed duration of breastfeeding.

RECOMMENDATIONS

1- Education of the pregnant mothers about the importance of breastfeeding of children for prevention of ASD.
2- Educate the pregnant mothers that, children who were breastfed with additional supplementation were also exposed to ASD.
3- Educate the pregnant mothers that, exclusive breastfeeding for complete 6 months is proved very important to prevent ASD in their children.
4- Nurses in healthcare facilities carry the responsibility to educate the mothers about these important issues.
5- More detailed and cases control and cohort studies are very required to be conducted to explore, more accurately the association between breastfeeding and ASD.

Conflict of interest:
Authors declared that there was no conflict of interest.

Budget:
This study was self-funded.

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