

The Relation between Breastfeeding and Incidence of Diabetes Mellitus Type I in Saudi Arabia, Cross Sectional Study

Alnasyan Abdulrahman, AlDayel Osamah, AlZaid Abdulrahman, Al Menqash Ahmed

Imam Muhammad ibn saud Islamic University
College of Medicine, Riyadh

ABSTRACT

Background: Diabetes is a complex, chronic illness requiring continuous medical care with multifactorial risk-reduction strategies beyond glycemic control. Type 1 diabetes is due to autoimmune β -cell destruction, usually leading to absolute insulin deficiency. Since that prevalence of type 1 diabetes increased globally and Saudi Arabia considered as one of the top 10 countries for number of children with type 1 diabetes. Our aim is to know the relation between breastfeeding and incidence of diabetes mellitus type I during childhood in Saudi Arabia, and to know if early weaning is a risk factor for diabetes mellitus type I. **Methods:** an online cross sectional survey, written in Arabic language targeting both males and females' living in Saudi Arabia from age 18 and below. **Results:** 407 participants 52.3% were diagnosed with type one diabetes and 47.7% are free from type one diabetes. 45% of participants are fed by breastfeeding only, 45.9% are fed by breastfeeding and formula while 9.1% were fed by formula only. 40.3% of participants were weaned at age of six months or less, while 21.6% at age of seven to twelve month. 38.1% of participants were weaned at age of thirteen to twenty four month. 52.3% of participants are diagnosed with type one diabetes with mean age of diagnosis at 10.6 years old, median at 10 years old and mode at 12 years old. 26.3% of those who are diagnosed with type one diabetes were fed by breastfeeding only while 59.6% were fed by breastfeeding and formula. On the other hand, 14.1% are fed by formula only. **Conclusion:** Type 1 diabetes has genetic predisposition, and as the affected relative is more closer, the risk is higher. Breastfeeding appears to be a protective factor against type 1 diabetes, and it is associated with less risk of getting type 1 diabetes.

Keywords: diabetes mellitus, breastfeeding, pediatrics, Saudi Arabia, KSA.

INTRODUCTION

Since that prevalence of type 1 diabetes increased globally and regionally by around 86,000 children develop type 1 diabetes each year and Saudi Arabia considered as one of the top 10 countries for number of children with type 1 diabetes also its medical care represents an economic burden on countries budget expected to spend more than 750 billion USD to treat diabetes in 2040. So it is worth to spend time and money to study its protective, associated, causative factors. Here, in our research we are studying whether that breastfeeding represents a protective effect for type 1 diabetes mellitus or not¹. Diabetes is a complex, chronic illness requiring continuous medical care with multifactorial risk-reduction strategies beyond glycemic control type 1 diabetes is due to autoimmune b-cell destruction, usually leading to absolute insulin deficiency². It is now clear from studies of first-degree relatives of patients with type 1 diabetes that the presence of two or more autoantibodies (islet-cell antibodies, insulin autoantibodies, autoantibodies to glutamic acid decarboxylase, the tyrosine phosphatase-related insulinoma associated 2 molecule, and the zinc transporter 8) is an almost certain predictor of clinical hyperglycemia and diabetes. Some forms of type 1 diabetes have no known etiologies. These patients have permanent insulinopenia and are prone to ketoacidosis, but

have no evidence of b-cell autoimmunity.

Although only a minority of patients with type 1 diabetes fall into this category, of those who do, most are of African or Asian ancestry. Individuals with this form of diabetes suffer from episodic ketoacidosis and exhibit varying degrees of insulin deficiency between episodes. This form of diabetes is strongly inherited and is not HLA associated. An absolute requirement for insulin replacement therapy in affected patients may be intermittent³.

There is global consensus on importance of breastfeeding. It is known that breastfeeding is a protective factor of inflammation of the stomach and intestines, colds, urinary infections, and ear infections. In addition, breast-feeding reduces the risk of sudden infant death syndrome (SIDS) as well as the likelihood of child illnesses and allergies, such as asthma and eczema. Breastfeeding helps protect children from serious diseases such as childhood leukemia. It is found that children and early adolescents who were breastfed for the first six months were less at risk for obesity compared to formula-fed babies. For example, when infants are breastfed through the first six months of their lives, the rates of being overweight between their 9 to 12 years of age are 22 percent lower than infants who don't get breastfed. In addition, there is some evidence that

breast-feeding may enhance motor development and reduce the risk of obesity in later life. Infants who are breast-fed for more than six months are five times less likely to develop childhood cancer. In addition to breastfeeding is a unique experience of the female body, and it can provide a deep delight between the mother and her child. Also, it has a calming effect on the baby and fosters closeness and love between baby and mother. Also, breastfeeding helps children to fight infection in the first few months of an infant's life⁴. Breastfeeding may have beneficial effects on cardiovascular risk factors later in life. This long-term effect of breastfeeding is believed to be due to the decreased rate of infant obesity resulting in lower blood pressure and serum cholesterol concentrations. Breastfed infants also seem to have better cognitive function. Superior cognitive development in breastfed infants is noted as early as 6 months of age and is sustained throughout childhood and adolescence. The benefits of human breast milk may be related to its high content in docosahexaenoic acid, which has an important role in brain development. Increasing the duration of breastfeeding is also correlated with an increase in cognitive development. However, no convincing evidence exists that breastfeeding reduces the risk of diseases such as leukemia or cancer, and evidence that breastfeeding decreases the incidence of allergic disease remains inconclusive occupation and so on. Many studies on the influence of breastfeeding and cow's milk introduction have adjusted results for some selected factors, mainly maternal age and education, but not for a group of other risk factors for type 1 diabetes mellitus. Older maternal age and low maternal education are shown as increasing risk of diabetes in offspring. Maternal preeclampsia, prematurity, neonatal illness and neonatal icterus caused by blood group incompatibility may be such risk factors for type 1 diabetes mellitus as well. Some events related to diabetes appear relatively shortly before the clinical manifestation of diabetes, probably promoting an already ongoing immune process. Such factors are infections and stressful life events. The women who had ever breastfed and who breastfed for longer duration have a lower risk of breast and ovarian carcinoma and also type 2 diabetes mellitus. Exclusive or predominant breastfeeding during the first six months postpartum prolongs lactational amenorrhoea⁵. Breastfeeding has economic advantages for the family because it is free. Thus, money is saved for the family, society, and the country. The children can be solely dependent on their mother's milk

until they are six-months old, and they do not need to add any food. According to the United States Breastfeeding Committee, years of research have confirmed that breastfeeding and breast milk is very important for the optimal health of infants, mothers, and society. Breastfeeding will affect both short and long-term health outcomes, and has effects on the U.S. economy. Formula feeding costs have increased steadily⁶.

The aim of our paper are to know relation between breastfeeding and incident to get diabetes Miletus type I during childhood in Saudi Arabia, and to know if early weaning is risk factor of diabetes Miletus type I

METHODS

On June 2017 we conducted an online cross sectional survey, we have used social media networks by putting a link to an electronic survey. It was written in Arabic language targeting children who live in the Kingdom of Saudi Arabia from age 18 years old and below. There were no exclusion criteria.

In the survey we wondered whether the participant has type one diabetes mellitus or not, and the age of diagnosis were the only personal information obtained.

In the second section there were two questions about feeding in early childhood, the first one is to determine whether the participant were on breastfeeding only, breastfeeding and formula, or formula only, the second question is about the age of weaning. Answers about age of weaning from breastfeeding were classified into 3 categories: 1) six months or less, 2) 7-12 months, and 3) 13-24 months. **The study was done after approval of ethical board of King Abdulaziz university.**

RESULTS

Total number of our questionnaire's respondents is 407, all are 18 years old or below, 213 (52.3%) are diagnosed with type one diabetes and 194 (47.7%) are free from type one diabetes (fig 1).

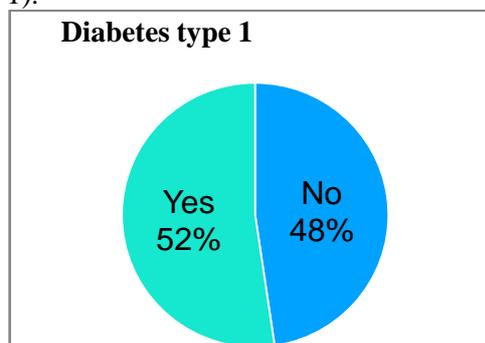


Fig 1: distribution of type 1 and type 2 among participants

183 (45%) of participants were fed by breastfeeding only, 187 (45.9%) are fed by breastfeeding and formula while 37 (9.1%) were fed by formula only (fig 2).

164 (40.3%) of participants were weaned at age of six months or less, while 88 (21.6%) at age of seven to twelve month. On the other hand, more than one third of participants (38.1%) were weaned at age of thirteen to twenty-four month. All participants live in Saudi Arabia. (fig 3)

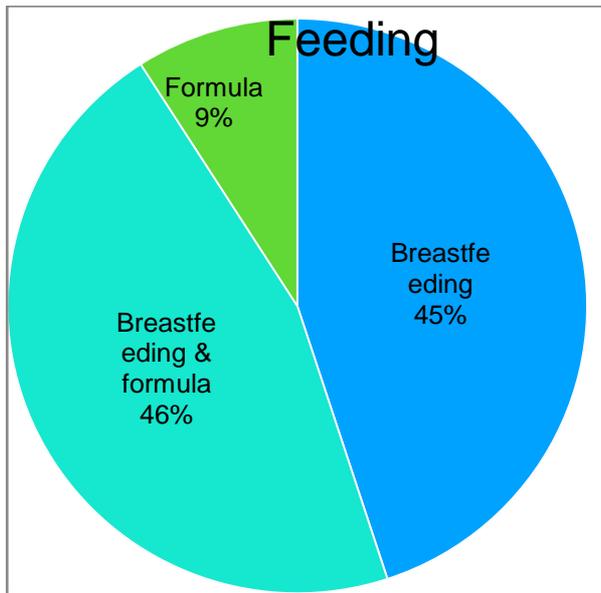


Fig 2: feeding ways among participants

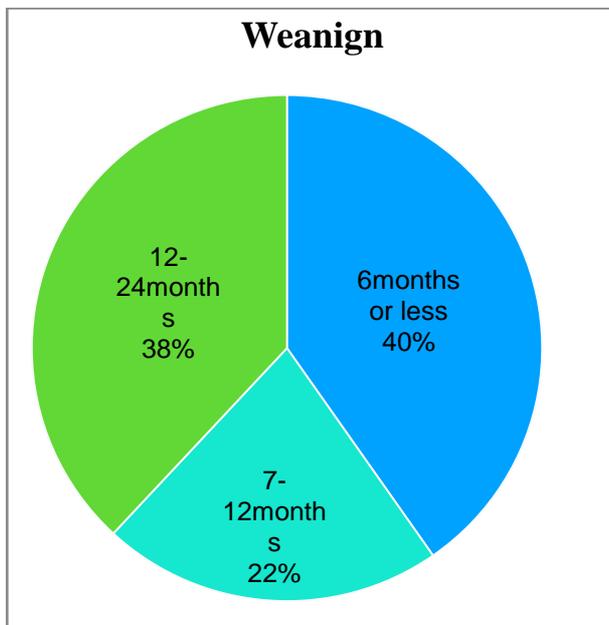


Fig 3: Weaning age among participants

Table (1): Breakup of participants who live in Saudi (N=407)

Characteristics	No	%
Participants who have not been diagnosed with diabetes	194	47,7
Participants who have been diagnosed with diabetes	213	52,3
Feeding type		
Participants who were feed by Breastfeeding	183	45.0
Participants who were feed by Breastfeeding and formula	187	45.9
Participants who were feed by Formula	37	9.1
Weaning age		
Participants who were Weaning at age 6 months or less	164	40.3
Participants who were Weaning at age 7-12 months	88	21.6
Participants who were Weaning at age 12-24 months	155	38.1

Table (2): Break up of participants who are diagnose with diabetes type I (N=213)

Characteristics	Number	Percentage
Age (Years)	Mode = 12 year	Mean= 10.6 median= 10
1	3	1.2
2	13	5.4
3	11	5.4
5	8	3.9
6	4	2.2
7	20	10.3
8	7	3.7
9	11	3.9
10	13	5.2
12	37	17.7
13	25	12.3
14	21	10.1
15	15	4.7
16	10	5.2
17	9	5.7
18	6	3.2
Relatives with diabetes type I		
Parents	94	44.1
Brother or sister	102	47.9
Uncle or Aunt	17	8

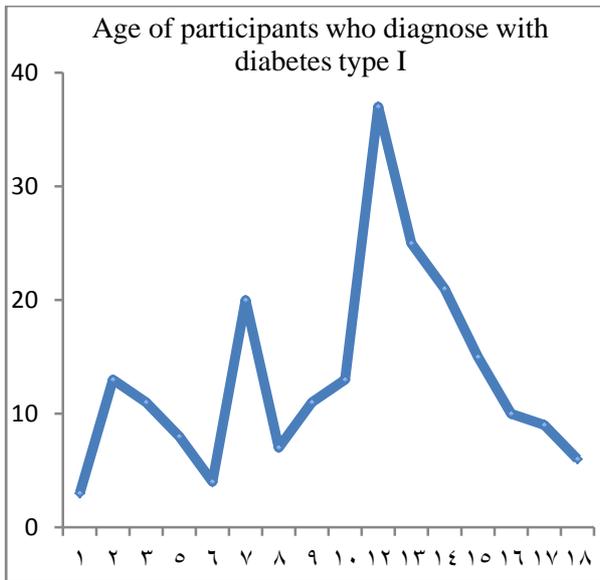


Fig 4: Age of participants who diagnose with diabetes type

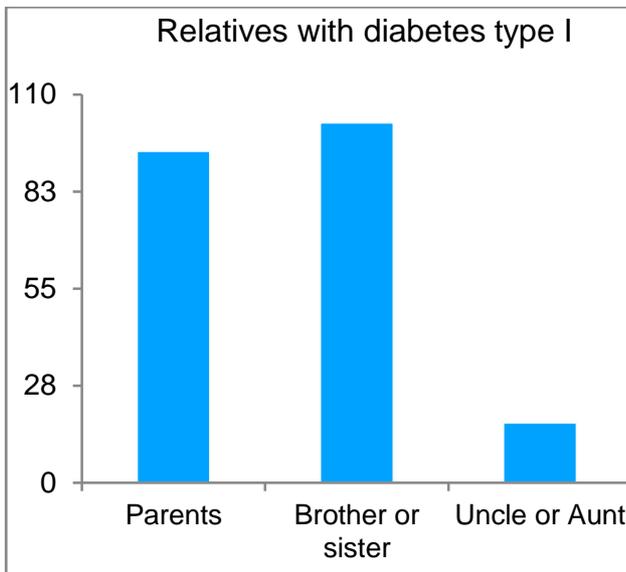


Fig 5: Relatives with diabetes type I

52.3% of participants are diagnosed with type one diabetes with mean age of diagnosis at 10.6 years old, median at 10 years old and mode at 12 years old.

56 (26.3%) of those who are diagnosed with type one diabetes were fed by breastfeeding only while 127 (59.6%) were fed by breastfeeding and formula. On the other hand, 30 (14.1%) of them were fed by formula only (P value = <0.001).

Table (3): Comparative analysis of incident of diagnose with type 1 diabetes and feeding type and weaning age

	Diabetes type 1		P value
	Yes	No	
Feeding			
Breastfeeding	56 (26.3)	127 (65.5)	<0.001
Breastfeeding and formula	127 (59.6)	60 (30.9)	
Formula	30 (14.1)	7(3.6)	
Weaning			
6 months or less	108(50.7)	56(28.9)	0.045
7-12 months	54(25.4)	34(17.5)	
12-24 months	51(23.9)	104(53.6)	

All values are represented as n(%) , P value <0.05 taken as significant

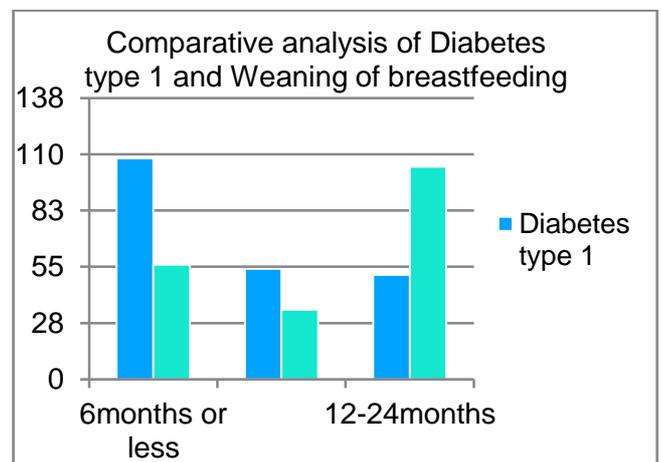


Fig 6: Comparative analysis of Diabetes type 1 and Weaning of breast-feeding

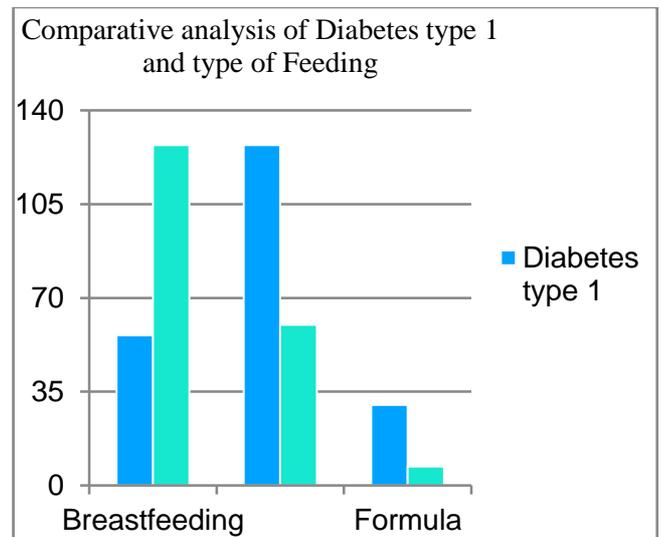


Fig 7: Comparative analysis of Diabetes type 1 and type of Feeding

DISCUSSION

In our research we found that 50.7 % of diabetic patient of our sample were weaned at age of 6 months or less, (25.4%) at age of seven to twelve month, while 51 (23.9%) at age of thirteen to twenty four month (P value = 0.045) and this result mean the longer the duration of breast feeding, the less risk of getting diabetes type 1⁷.

We found that 44.1 % -of our sample who were diagnosed with type1 DM -have one or more affected parent by type one diabetes, 47.9 % have one or more affected brother or sister, and 8 % have one or more affected uncle or aunt. this result suggest a strong genetic predisposition⁵

Of our research results we found that (65.5%) - of our sample who were free from diabetes - were fed by breastfeeding only, (30.9%) were fed by breastfeeding and formula, and (3.6%) were fed by formula only, this pointing toward the importance of breastfeeding as a protective factor against type 1 diabetes⁸.

In our sample we found that among those who are free from type one diabetes (28.9%) are weaned at age of six months or less, (17.5%) are weaned at age of seven to twelve month while around half of them (53.6%) were weaned at age of thirteen to twenty four month and this strongly support the importance of breastfeeding as a protective factor against type 1 diabetes⁹.

Among those who are diagnosed with type one diabetes, 108 (50.7%) were weaned at age of six months or less, 54 (25.4%) at age of seven to twelve month, while 51 (23.9%) at age of thirteen to twenty four month (P value = 0.045)¹⁰.

Among those who are diagnosed with type one diabetes, 44.1 % have one or more affected parent by type one diabetes, 47.9 % have one or more affected brother or sister, and 8 % have one or more affected uncle or aunt.

194 (47.7%) of our questionnaire's respondents are free from type one diabetes; around two thirds of them (65.5%) were fed by breastfeeding only, 60 (30.9%) were fed by breastfeeding and formula. On the other hand, 7 (3.6%) were fed by formula only, (P value = <0.001)⁸.

Among those who are free from type one diabetes; 56 (28.9%) are weaned at age of six months or less, 34 (17.5%) are weaned at age of seven to twelve month while around half of them (53.6%) were weaned at age of thirteen to twenty four month (P value = 0.045)¹⁰.

CONCLUSION

Type 1 diabetes has genetic predisposition, and as the affected relative is more closer the risk is higher. Breastfeeding appears to be a protective

factor against type 1 diabetes, and it is associated with less risk of getting type 1 diabetes.

ACKNOWLEDGEMENT

We thank all our participants for the success of this research , This research received no specific grant from any funding agency in the public, commercial , or not-for-profit sectors.

Conflict of interest

We have not been paid for this research.

REFERENCES

- 1- **Alkhizi M (2016):** *Promoting breastfeeding in Saudi Arabia*(Doctoral dissertation, San Diego State University) <https://search.proquest.com/openview/71de7255f59486a3ee7fe9491511ca90/1?pq-origsite=gscholar&cbl=18750&diss=y>
- 2- **Chowdhury R, Sinha B, Sankar J, Taneja S and Bhandari N et al (2015):** Breastfeeding and maternal health outcomes: a systematic review and meta-analysis. *Acta Paediatrica*, 104(467):96-113.
- 3- **Knip M, Virtanen M, Becker D, Dupré J, Krischer P, and Åkerblom K (2011):** Early feeding and risk of type 1 diabetes: experiences from the Trial to Reduce Insulin-dependent diabetes mellitus in the Genetically at Risk (TRIGR). *The American journal of clinical nutrition*, 94(6):1814S-1820S.
- 4- **Riviello C, Mello G, and Jovanovic L (2009):** Breastfeeding and the basal insulin requirement in type 1 diabetic women. *Endocrine Practice*, 15(3):187-193.
- 5- **Kimpimäki T, Erkkola M, Korhonen S, Kupila A, Virtanen M, Ilonen J, and Knip M (2001):** Short-term exclusive breastfeeding predisposes young children with increased genetic risk of Type I diabetes to progressive beta-cell autoimmunity. *Diabetologia*, 44(1): 63-69.
- 6- **Alzaheb A (2017):** Factors Influencing Exclusive Breastfeeding in Tabuk, Saudi Arabia. *Clinical medicine insights. Pediatrics*, 11:33-35.
- 7- **American Diabetes Association (2014):** Diagnosis and classification of diabetes mellitus. *Diabetes care*, 37 (1):S81-S90.
- 8- **Patelarou E, Girvalaki C, Brokalaki H, Patelarou A, Androulaki Z, and Vardavas C (2012):** Current evidence on the associations of breastfeeding, infant formula, and cow's milk introduction with type 1 diabetes mellitus: a systematic review. *Nutrition Reviews*, 70(9):509-519.
- 9- **Wenzlau M, Juhl K, Yu L, Moua O, Sarkar A, Gottlieb P, and Hutton C (2007):** The cation efflux transporter ZnT8 (Slc30A8) is a major autoantigen in human type 1 diabetes. *Proceedings of the National Academy of Sciences*, 104(43):17040-17045.
- 10- **David C, Joao R, Lydia M, Katherine O, Sara W (2015):** IDF Diabetes Atlas Seventh Edition <https://www.idf.org/e-library/epidemiology-research/diabetes-atlas.html>