ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 12, Issue, 09, pp.13758-13760, September, 2020

DOI: https://doi.org/10.24941/ijcr.39734.09.2020

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

EXCLUSIVE BREAST FEEDING PREVENT ARSENIC TOXICITY IN BABY OF ARSENIC AFFECTED LACTATING MOTHER

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ARTICLE INFO

Article History:
Received 19th June, 2020
Received in revised form
17th July, 2020
Accepted 24th August, 2020
Published online 30th September, 2020

Key Words:

Arsenic affected mother, Melanosis, Keratosis, Urinary arsenic Concentration.

ABSTRACT

Introduction: Arsenic is naturally occurring element that is widely distributed in nature. The main source of exposure for the general population is intake of drinking water with high level of arsenic. There is evidence of fetal loss & infant mortality due to arsenicexposure of mother by drinking water that may be due to arsenic crosses the placenta. Breast milk is main source of nutrition during 1st 6 months of life. There are few reports of low concentration of arsenic in breast milk. Urinary arsenic is considered as dependable marker of ongoing contamination. Arsenic level in urine of exclusive breastfed baby shows the intake of arsenic through breast milk. **Objective:** To detect arsenic secreted through breast milk from arsenic affected mother by measuring urinary arsenic level. **Methods:** It was a case-control prospective study. From January 2008 to July 2009 this study was done in Laksam thana in Bangladesh. Total 80 exclusively breast fed babies were enrolled in this study, 40 babies were cases whose mother were arsenic affected &40 babies of control group were nonaffected mother. To detect arsenic concentration in breast milk we considered as arsenic level in urine. We thoroughly examine mothers& their babies. **Results:** In this study total 80 breast fed babies were enlisted, 40 from affected mother & 40 from non-affected mother. Arsenic affected mothers showed 100% melanosis &27.3% keratosis .Arsenic concentration in urine in affected mother (case) was 329.57microgram/L±106.017 & median was 379.67 micro gm/l, arsenic level in urine of baby of affected mother (case) is7.02±1.05. In control group both mothers urinary arsenic level& babies urinary arsenic level were low. Physical growth & milestone of development were normal in both group of babies. **Conclusion:** All Arsenic affected lactating mother should continue their breast feeding exclusively without harm to their babies.

Citation: ***Ferdousi Hasnat, Farhana Noman, Sakina Shab Afroz, Mohammad Shawkat Hossain Khan, Rifat Taher Anne and A. K. Al Miraj.*** **2020.** "Exclusive breast feeding prevent arsenic toxicity in baby of arsenic affected lactating mother", *International Journal of Current Research*, 12, (09), 13758-13760.

INTRODUCTION

Arsenic is not a typical metal, it is a so called metalloid exhibiting a metallic characteristics. Arsenic toxicity is a one of the public health problem in our country. Humans are affected by arsenic by different ways. The main source of arsenic exposure for the general population is intake of drinking water with high level of arsenic. Globally more than 100 million people are exposed to arsenic and Bangladesh is one of the most severely affected country.[1]

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Though ground water is main source of water supply in rural areas so due to prevention of diarrhoea, cholera & other water-borne diseases a large number of shallow tube wells were installed throughout the country & these tube wells are the major cause of arsenic poisoning. The WHO provitional value of guideline value(GV) of 10 microgram/L for arsenic in drinking water, while many countries including Bangladesh have retained the value of 50 microgm/l as national standard [2].Chronic toxicity has more insidious onset and may take from 6 months to 2 years. Arsenicosis (chronic toxicity) maybe non carcinogenic effects & carcinogenic effects.In Argentina, where the arsenic concentration in drinking water is about

200microgm/l, the median concentration of arsenic in placenta reported to be 34 microgm/l in compared to 7 microgm/l in unexposed women[3,4]. In pregnancy Arsenic may cause spontaneous abortion, still birth & preterm birth [5]. Mile stone of development of children affected by high urinary arsenic concentration[6]. Arsenic exposure on the CNS of children have not been explored. Breast milk is only food for exclusive breast fed baby upto 6 months of age. In case of Arsenic affected lactating mother secrets very little amount of arsenic through breast milk (5-2 microgm/l). Though the exclusive breastfed babies take mothers milk only so we considered that urinary arsenic represents the ingestion of arsenic through milk. In Bangladesh measurement of Arsenic through milk is not possible at that time. Arsenic in urine is a reliable indicator of recent exposure[7]. After ingestion arsenic appears in urine within 2-8hours. Hair& nail is the reliable indicator of chronic exposure. So we measure the urinary arsenic level of both affected mother& non affected mother & their babies to see the protection of baby by breast milk from arsenic toxicity.

METHODOLOGY

This is a prospective case control study which was conducted in Laksam thana, Bangladesh from January 2008 to July 2009. From upazilla health complex register we taken 40 arsenic affected mother & their exclusive breastfed babies at 6 months of age as cases & we also taken 40 non affected mother with babies at 6 months of age as control group .Mothers were diagnosed by clinical manifestation of arsenic & other complication & they had h/o taking arsenic contaminated water for more than 6 months. Detailed information was taken from mother about breast feeding practice of babies. For their growth & development & vital parameters we examined the babies thoroughly .Weight of babies were measured by weighing machine and expressed as kg, supine length and OFC..Gross motor development of babies were looked for clinically as neck control, sit with support .Arsenic concentration of urine of affected mother & their babies were taken to see the status of arsenic. Ten ml mid-stream urine was collected from mothers and babies in a plastic container, given a code number and stored in a cold chain maintaining box and after that stored in refrigerator. These samples were transported to laboratory after proper maintaining of cold chain. SPSS version 20.0 was used for analysis of collected data. All patients were given an explanation of the study and informed written consent was taken from each patient. Permission from local authority and from ethical committee was also taken.

RESULTS

In this study 40 arsenic affected mother with their babies were taken as cases and 40 non affected mother with their babies were taken as control .Mothers age ranged from 19-35 years with mean age of 23 years. Arsenic affected mothers showed 100% melanosis & 30% keratosis .Age of the babies in this study was 6 months. Male sex were found in 50% in case group and 53% in control group and female sex were found in 50% in case group and 46.7% as control group. [Table1]showed Arsenic concentration in urine of both group of mother mean SD±was 329.57microgram/L±106.03 & median was 379.67 micro gm/l and arsenic level in urine of control group mean ±SD was 18.17microgm/l±6.89 and median was 17.2 microgm/l. The difference was statistically significant (p value <0.05). In [Table 2] showed urinary arsenic level of both group of babies were distributed where low concentration of arsenic in both groups of babies and found baby of affected mother(case group) is7.02±1.05 microgm/l and In control group 6.01±2.32microgm/l. The difference between two groups was not statistically significant (.>0.05). In [Table3] showed the weight, length, OFC of two groups of babies and data were analyzed and no significant difference was found. Development of two groups of babies were age appropriate.

Table 1. Arsenic level (µgm/L) in urine of mother in case and control group (N=80)

Group		P Value
Cases(n=40)	Control(n=40)	
329.57±106.53(Mean)	18.17±6.89(Mean)	0.001
379.67(Median)	17.2(Median)	

Table 2. Arsenic level (µgm/L)in urine of babies in case and control group (N=80)

Group		P Value
Cases(n=40)	Control(n=40)	
7.02±.05(Mean)	6.01±2.32 (Mean)	0.001

Table 3. Weight & length of babies in case and control group (N=80)

Variables	Group	
	Cases(n=40)	Control(n=40)
Weight(kg)	6.95±0.23	7.01±0.35
Length(cm)	64.01±1.97	63.02±1.08

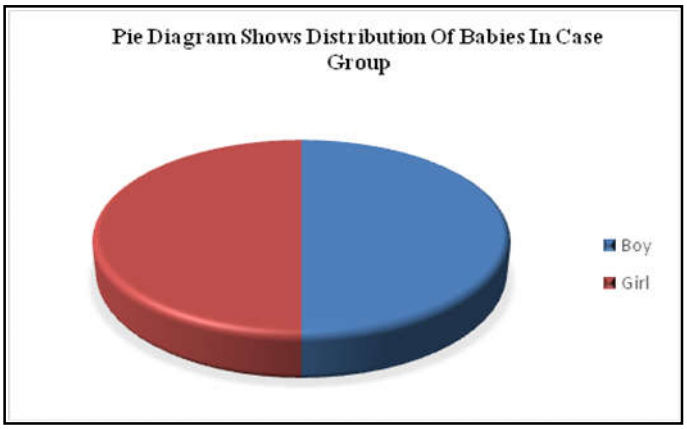

Figure 1. Distribution of babies in case group

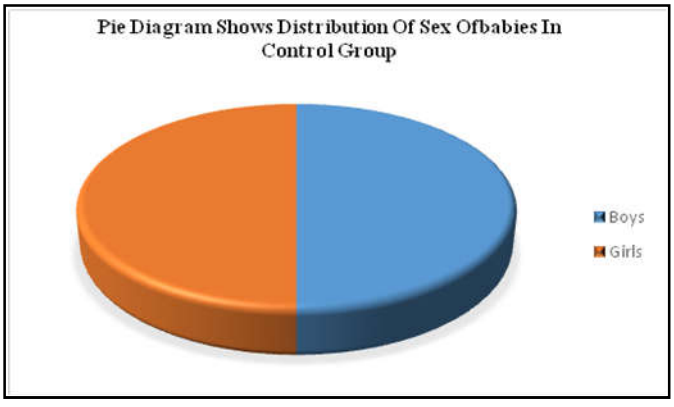

Figure 2. Distribution of sex of babies in control group

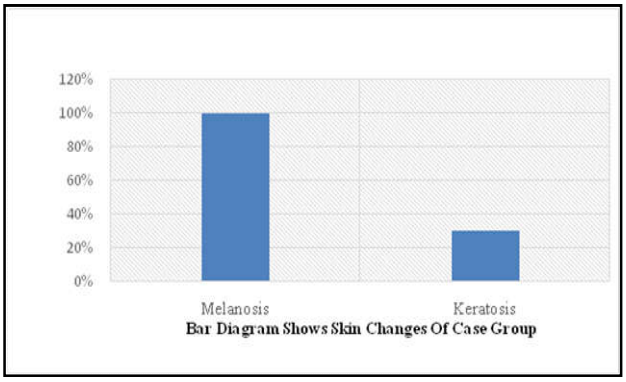

Figure 3. Skin changes of case group

DISCUSSION

The main source of arsenic exposure for the general population is intake of drinking water with high level of arsenic[8]. An estimated of about 70 million people are at risk from drinking arsenic contamination water in Banglades[9].Breast milk is main food of babies for first 6 months of age. Physical growth, proper development and protection of babies from diseases depends on breast milk, so composition of human milk is important .A few reports on the concentration of arsenic in breast milk have been published[10,11,12,13].Arsenic concentration in breast milk were low1 micrgm/kg[11] .Due to maternal methylation of inorganic arsenic(iAs) in plasma arsenic do not easily pass through mammary gland and thus less amount arsenic secreted through breast milk.In this study arsenicosis mothers skin manifestation as melanosis 100% & keratosis present in only 12 patient (30%)[14]. Arsenic concentration in urine of babies of both groups were analyzed & showed no significant difference that also showed indirectly arsenic concentration in milk is also low, ,this results of this study similar to different study [3,4.1215.] . In table3 showed weight, length and OFC of the affected and non-affected groups and in this study difference between weight, length& OFC of both groups' babies were not found to be statistically significant. Similar observations were made by others [16].So from this study we found that very little amount of arsenic in urine represents the low amount of arsenic secreted in breast milk. So exclusive breast feeding protect the baby from exposure to arsenic.

Conclusion

Urinary Arsenic is a reliable indicator of recent exposure and indirectly reflects the concentration of arsenic in breast milk .So low level of arsenic in urine showed that exclusive breast feeding protect the baby from arsenic toxicities and did not any effect of growth and development. So all arsenic affected lactating mother can safely continue breast feeding without harm to their babies. There is a urgent need for evaluation of arsenic in infant formula & weaning food in arsenic exposed area

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