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Some risk factors of chronic gastroenteritis among preschool children in a rural area in Basyun District, Gharbia governorate

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Abstract---Background: Gastroenteritis, also known as infectious diarrhea, is inflammation of the gastrointestinal tract the stomach and small intestine. Symptoms may include diarrhea, vomiting and abdominal pain. The aim of this work was to reduce morbidity and mortality from chronic gastroenteritis among preschool children. Methods: This case control study was carried out on 100 study children < five years having chronic gastroenteritis and 100 control children were healthy children chosen randomly from children attending nurseries and from the same family health care unit, they were matched by age and sex with cases. Results: Age of child, residence, fathers education and job and mothers age and education were not found to significantly affect occurrence of chronic diarrhea among studied children. Crowding index and family size had high odds ratio whereas the odds of exposure to a high crowding index (more than or equal to 2) among cases were double that among the control. Odds of exposure to a large family size (more than or equal to 5) among cases were double that among the control ($p>0.05$). Fathers age >40 years in cases was 25% which was higher than 13% of control (OR=2.231). Regarding mothers' job, housewife mothers' percentage in

cases was 64% which was significantly higher than 49% of control (OR=1.850). Regarding type of housing, rented housing in cases was reported by 11% which was higher than 3% of control (OR= 3.996). So that fathers age >40 years, housewife mothers and rented housing were found significant risk factors for chronic diarrhea. Conclusions: This study identified some possible risk factors of chronic gastroenteritis as: Fathers age >40 years, regarding mothers' job, housewife mothers were risk factor for chronic diarrhea in children and regarding housing, rented housing was a significant risk factor for chronic diarrhea in children.

Keywords---risk factors, chronic gastroenteritis, preschool children, rural area.

Introduction

Gastroenteritis, also known as infectious diarrhea, is inflammation of the gastrointestinal tract the stomach and small intestine [1]. Symptoms may include diarrhea, vomiting and abdominal pain [2]. Fever, lack of energy and dehydration may also occur [3]. It is not related to influenza, though it has erroneously been called the "stomach flu" [4]. There is a wide range of recognized enteric pathogens as virus, bacteria and parasites that cause gastroenteritis. As for bacteria, shigella and Escherichia coli are the most common causes of diarrheal diseases in developing countries [5]. The main symptom of gastroenteritis is diarrhea, but it may be accompanied by nausea, vomiting and abdominal pain. The severity of illness may vary from mild annoyances to severe and life threatening [6].

In 2015 two billion cases of gastroenteritis resulted in 1.3 million deaths globally [7]. Children and those in the developing world are affected the most [8]. In 2011, 1.7 billion cases resulting in about 700,000 deaths of children under the age of five [9]. In the developing world children less than two years of age frequently get six or more infections a year [10]. It is less common in adults, partly due to the development of immunity [11]. The aim of this work was to reduce morbidity and mortality from chronic gastroenteritis among preschool children. Identify some risk factors of chronic gastroenteritis among preschool children in a rural area in Basyun District, Gharbia Governorate.

Patients and Methods

This case control study was carried out on 100 study children less than five years having chronic gastroenteritis attending the family health care unit in Kafr Gaafar village with their family member(s) and 100 control children were healthy children chosen randomly from children attending nurseries in the same village and from children attending the same family health care unit, they were matched by age and sex with cases. This study started from July 2018 and completed by the end of July 2020. The study was done after approval from the Ethical Committee Tanta University, Egypt. An informed written consent was obtained from mothers to participate in the study.

Methods of data collection

Preparatory phase

Literature review: Reviewing of available current and past literature and research related to the subject of the study was done (from July 2018 to October 2018). Preparation of questionnaire and protocol of the study: The protocol was approved by the council of Public Health Department on 2 December 2018 and from the university council on 18 February 2019. Also, the questionnaire was prepared during this period. Preliminary visits and communications were made to primary health care unit of Kafr Gaafar, Basyun District, Gharbia Governorate in April 2019: to orient them with the objectives and procedures of the study and to get their cooperation and help and determine the number of children less than 5 years having chronic gastroenteritis attending the family health care unit. They were ranged from 10-15 case per month. Validation of questionnaire; this was done by (1) Face content validity, the questionnaire was revised by a panel of 4 experts to test its validity. The experts are professors of Public Health and Community Medicine.

Scale Content Validity Index (SCVI), was measured for the designed questionnaire, it was 87% (A score of >80% was considered to have a good validity.) 2 Test- re- test reliability (Alpha Krnobuch's test) it was 0.85. A pilot study (during May 2019) was carried out before starting data collection and included 10% of subjects. (The results not included in the study) with the following objectives. To test and evaluate the adequacy of the designed questionnaire and it was found adequate, estimate the time needed for filling the questionnaire and it ranged from 10 to 15 minutes and determine the potential obstacles that might be met with during the execution of the study. Data were collected through the following procedure: The parents were asked to fill the pre-designed questionnaire after complete understanding of the objectives of the study. This procedure was done for 3 days per week. Each questionnaire took about 15 minutes in the average to be filled. This procedure was continued till the needed sample was collected (average 6 months)

Tools of the study

The questionnaire included the following items: (Socio demographic characteristics, medical history for diagnosis of chronic gastroenteritis in the child, mothers' information about chronic gastroenteritis in children, mothers' practices, and examination of the child) Medical history for diagnosis of chronic gastroenteritis: This included information about number of episodes of diarrhea and gastroenteritis in last month and last six months, about number of doctor visits in last six months and if the child stayed at hospital because of gastroenteritis or not. Also, it included some information about type of lactation, time of weaning, type of food introduced to the child and immunizations.

Mother information about chronic gastroenteritis in children: It included asking the mother about definition, causes, symptoms of gastroenteritis in children. Also, it included mother knowledge about cleaning of house and toilet and its relationship to occurrence of gastroenteritis and her knowledge about safe

preparation of food for child. Mother practices: It included mother practices in hand washing, preparation of food, fruit and vegetables washing and storage of food in the refrigerator. Examination of child for fever, pallor, inflamed tonsils and signs of dehydration including mouth dryness, skin elasticity, sunken eyes, tears and ability for water drinking.

Sample Size Calculation

Criteria used for sample size calculation are: - study design is a case control, 95% confidence limit, 80% power of the study and expected prevalence of risk factors for chronic gastroenteritis is 30% among control and 50% among cases. Based on these criteria, the sample size was calculated as $N > 95$ for each group. The sample size was increased to 100 for each group to compensate any missed data.

Statistical analysis

The collected data were organized, tabulated, and statistically analysed using SPSS version 19 (Statistical Package for Social Studies) created by IBM, Illinois, Chicago, USA. For numerical values the range mean, and standard deviations were calculated. The differences between two mean values were used using student's t test. For categorical variable the number and percentage were calculated and differences between subcategories were tested by chi square test. When chi square was not appropriate due to small observations, Fisher's and Monte Carlo exact tests were used. The risk of occurrence of chronic diarrhea in relation to different predictors was estimated by calculation of odds ratio and 95% confidence interval. The level of significant was adopted at $p < 0.05$.

Results

Table (1) shows distribution of studied groups by age and sex. There was no statistically significant difference between cases and controls as regard sources of medical services.

Table 1: Distribution of studied groups by age, sex, and sources of medical services

Variables		Cases (n=100)	Control (n=100)		
Age in years					
<2		8	7		
2		37	38		
3		34	34		
4		19	19		
5		2	2		
Mean±SD		2.98 +0.90	2.98+0.88		
Sex	Males	50	50		
	Females	50	50		
Sources of medical services		Cases (n=100)	Control (n=100)	X ²	p
Private		44	35	1.695	0.193

Health insurance	12	11	0.049	0.825
Primary health care	74	69	0.613	0.434

Data are presented as mean $\pm$ SD or frequency.

Fathers' age and job were significantly different between the two groups ($P=0.042$ and 0.009 respectively). Fathers' education, mothers' age, education, family size, residence, and crowding index were insignificantly different between the two groups. Mothers' job and type of housing was significantly different between the two groups ($P=0.023$ and 0.027 respectively). Table 2

Table 2: Distribution of studied groups by fathers' characteristics

Variables	Cases (n=100)	Control (n=100)	X ² /t	p
Fathers' characteristics				
Fathers' age				
20	23	27		
30-	52	60		
40-50	25	13		
Mean±SD	33.86+5.75	32.32+4.87		
Fathers' education			3.153	0.369
Illiterate	15	10		
Primary	25	34		
Secondary	28	22		
University	32	34		
Fathers' job			15.314	0.009*
Unemployed	0	9		
Manual worker	21	9		
Skilled manual worker	41	39		
Employee	23	25		
private work	4	8		
Professional	11	10		
Mothers' characteristics				
Mothers' age				
20	45	62		
30-	54	38		
40-50	2	0		
Mean±SD	29.02+5.21	28.08+4.49		
Mothers' education			1.393	0.707
Illiterate	20	14		
Primary	33	34		
Secondary	16	19		
University	31	33		
Mothers' job			4.577	0.023*
Housewife	64	49		
Working	36	51		
Family characteristics				
Family size			2.848	0.241
3	41	44		

4	42	47		
5-6	17	9		
Residence			2.189	0.139
Rural	71	80		
Urban	29	20		
Crowding index			1.454	0.228
<2	88	93		
>2	12	7		
Type of housing			4.916	0.027*
Owned	89	97		
Rented	11	3		

Data are presented as mean $\pm$ SD or frequency, *: significant P value

Regarding frequency of diarrheal attacks in last month and last six months, the difference was statistically significant higher in cases group compared to controls (P=0.001). This difference in physicians' visits was statistically significant (p=0.001). Hospital admissions last six months were significant higher in cases group compared to controls (p=0.001). Feeding pattern, attendance of nursery and vaccination were insignificantly different between two groups. Table 3

Table 3: Distribution of studied groups in relation to diarrheal attacks, feeding pattern, attendance of nursery and vaccination

Diarrheal attacks	Cases (n=100)	Control (n=100)	X ²	p
Last month			MCET	0.001*
None	0	100		
Once	7	0		
Twice	51	0		
Three or more	42	0		
Last six months			108.48	0.001*
1-2	1	41		
3-4	29	56		
5-6	44	3		
>7	27	0		
Physicians visits last six months			97.766	0.001*
1	0	17		
2	5	46		
3	26	26		
4	30	11		
5	23	0		
6	16	0		
Hospital admissions last six months			MCET	0.001*
0	2	100		
1	18	0		
2	48	0		
3	28	0		
4	4	0		

Diarrheal attacks				
Lactation			3.014	0.083
Breast feeding	74	84		
Artificial	26	16		
Age at first admission of food in months				
3-	55	62		
6-	43	38		
9-	2	0		
Mean±SD	5.18±1.39	5.28±0.78	0.626	0.532
Attendance of nursery			0.479	0.489
Attendance of nursery	12	9		
Current feeding			MCET	1.000
Home food	91	92		
Breast milk and home food	8	7		
Artificial milk and home food	1	1		
Vaccination			0.244	0.621
Yes all	90	92		
Some but not all	10	8		

Data are presented as mean ± SD or frequency, *: significant P value

Soft stools once, soft stool more than three times/day, defecation > three time/day, gastro-intestinal infection, and unclean hands were insignificantly different between two groups. Several unusual frequent soft stools, fever, abdominal colic, vomiting, undigested food, teething, unclean toilets, clean food prevent diarrhea and getting rid of flies prevent diarrhea were significantly lower in cases group than controls ($P<0.05$). Television and family health units were significantly different between two groups ($P=0.005$ and 0.028 respectively). Table 4

Table 4: Knowledge of studied mothers about definition, manifestations and causes of diarrhea and source of knowledge about diarrhea

Definition of diarrhea	Cases (n=100)	Control (n=100)	X^2	p
Soft stools once	71	72	0.025	0.876
Soft stool more than three times/day	99	100	FE	1.000
Several unusual frequent soft stool	93	100	FE	0.014*
Manifestations of infection diarrhea				
Defecation > three time/day	100	100	0.000	1.000
Fever			37.858	0.001*
Yes	30	73		
Don't know	23	6		
Abdominal colic			13.401	0.001*
Yes	65	87		
Don't know	13	4		
Vomiting			26.115	0.001*

Yes	29	65		
Don't know	24	13		
Causes of diarrhea				
Undigested food			MCET	0.008*
Yes	89	99		
Don't know	7	1		
Teething			42.027	0.001*
Yes	37	82		
Don't know	29	8		
Gastro-intestinal infection			4.777	0.092
Yes	74	82		
Don't know	17	7		
Unclean toilets			MCET	0.001*
Yes	46	84		
Don't know	50	12		
Unclean hands			MCET	0.118
Yes	84	92		
Don't know	14	5		
Clean food prevent diarrhea			MCET	0.001*
Yes	100	82		
Don't know	0	15		
Getting rid of flies prevent diarrhea			26.378	0.001*
Yes	28	46		
Don't know	68	34		
Source of knowledge				
Television	84	96	8.000	0.005*
Family health units	45	30	4.800	0.028*
Radio	0	1	FE	1.000
Newspapers	0	1	FE	1.000
Internet	3	3	FE	1.000

Data are presented as mean $\pm$ SD or frequency, *: significant P value

Regarding washing hands before preparing food, after toilets covering food to avoid flies, and Separation of raw from cooked food were significantly lower in cases than control ($p=0.001$). Regarding washing vegetable eaten raw and keep food in refrigerators, there was no statistically significant difference between cases and control. Table 5

Table 5: Practices of studied mothers concerning diarrhea prevention

Practices	Cases (n=100)	Control (n=100)	X^2	p
Washing hands before preparing food			MCET	0.001*
Sometimes	49	8		
Always	47	89		
Washing hands after toilets			MCET	0.001*
Sometimes	58	27		
Always	41	73		

Washing vegetable eaten raw			1.452	0.228
Sometimes	18	25		
Always	82	72		
Keep food in refrigerators			MCET	0.694
Sometimes	59	52		
Always	40	47		
Cover food to avoid flies			MCET	0.001*
Sometimes	58	32		
Always	38	67		
Separate raw from cooked food			MCET	0.001*
Sometimes	65	33		
Always	33	67		
Manifestation		Number (n=100)		
Frequency of diarrhea/day				
4		40		
5		47		
6		13		
Bloody stools		45		
Mucous in stools		83		
Undigested food		94		
Foul smelling		98		
Fever		21		
Pallor		52		
Tonsillitis		23		
Signs of dehydration				
Sunken eye		75		
Lethargic		40		
Mouth dryness		98		
Lost skin elasticity		18		
Loss of tears		96		
Irritability		68		
Not able to drink		18		
Drinks eagerly		82		

Data are presented as mean $\pm$ SD or frequency, *: significant P value

Age of child, residence, fathers; education and job and mothers' age and education were not found to significantly affect occurrence of chronic diarrhea among studied children. Crowding index and family size had high odds ratio whereas the odds of exposure to a high crowding index (more than or equal to 2) among cases were double that among the control. Odds of exposure to a large family size (more than or equal to 5) among cases were double that among the control ($p>0.05$). However, both factors were not significant statistically. Fathers age >40 years in cases was 25% which was higher than 13% of control (OR=2.231). Regarding mothers' job, housewife mothers' percentage in cases was 64% which was significantly higher than 49% of control (OR=1.850). Regarding type of housing, rented housing in cases was reported by 11% which was higher than 3% of control (OR= 3.996). So that fathers age >40 years, housewife mothers and rented housing were found significant risk factors for chronic diarrhea. Table

Table 6: Risk factor of chronic diarrhea

Variables	Cases (n=100)		Control (n=100)		OR	95% CI
	n	%	n	%		
Age of child						
<3	45	45.0	45	45.0	1.000	0.573-1.746
>3	55	55.0	55	55.0		
Residence						
Rural	71	71.0	80	80.0	0.612	0.319-1.176
Urban	29	29.0	20	20.0		
Fathers' age						
>40	25	25.0	13	13.0	2.231*	1.067-4.666
<40	75	75.0	87	87.0		
Fathers' education						
Less than secondary	40	40.0	44	44.0	0.848	0.484-1.489
Secondary/University	60	60.0	56	56.0		
Fathers' job						
Unemployed/manual	62	62.0	57	57.0	1.231	0.699-2.167
Employee/professional	38	38.0	43	43.0		
Mothers' age						
<25	33	33.0	38	38.0	0.804	0.450-1.436
>25	67	67.0	62	62.0		
Mothers' education						
Less than secondary	53	53.0	48	48.0	1.222	0.701-2.128
Secondary/University	47	47.0	52	52.0		
Mothers' job						
Housewife	64	64.0	49	49.0	1.850*	1.051-3.259
Working	36	36.0	51	51.0		
Family size:						
<5	83	83.0	91	91.0		
>5	17	17.0	9	9.0	2.071	0.875-4.899
Type of housing						
Rented	11	11.0	3	3.0	3.996*	1.080-14.790
Owned	89	89.0	97	97.0		
Crowding index						
<2	88	88.0	93	93.0		
>2	12	12.0	7	7.0	1.812	0.682-4.881
Lactation						
Artificial	26	26.0	16	16.0	1.845	0.919-3.703
Breast	74	74.0	84	84.0		
Vaccination:						
Yes all	90	90.0	92	92.0		
Some but not all	10	10.0	8	8.0	1.278	0.782-3.384

Discussion

Regarding distribution of studied groups by fathers' characteristics, the odds of having fathers ages more than 40 years among cases were twice that among control. This difference in age of fathers of patients and control was statistically significant (OR=2.231). Regarding fathers' job, there was statistically significant difference between cases and controls. More manual workers were found in cases (OR=1.231). Differences in relation to education were not found statistically significant and this result disagreed with a study done by Nahar et al., ^[12] in Bangladesh who reported that educational status of father determines the economy and social class of the family so influences management of child illness with gastroenteritis as father is responsible for children health and curing them from diseases.

Regarding mothers' education, there was no statistically significant difference between cases and control (OR=1.2). This result agreed with a study by Kandala, ^[13] in Nigeria and a study by Sonali et al., ^[14] who reported that no significant association between mothers' education and prevalence of gastroenteritis. This result disagreed with a study by Shah et al., ^[15] in India as education of mother provides her the rules of feeding, hygiene and weaning and that decreases the risk for gastroenteritis.

Regarding mothers' job, there was statistically significant difference between cases and controls (OR=1.85). More housewife mothers were found in cases as compared to control group. This result agreed with a study by Sonali et al., ^[14] who reported that mild association was seen for working mothers as compared to non- working mothers which have more association. This study revealed that both crowding index and family size had high odds ratio whereas the odds of exposure to a high crowding index (more than or equal to two) among cases were nearly double that among the control. Odds of exposure to a large family size (more than or equal to five) among cases were double that among the control. However, both factors were not significant statistically.

Regarding residence, most cases (71%) and control (80%) were of rural residence and there was no significant statistical difference between cases and control (OR=0.7). This result agreed with a study by Majowicz et al., ^[16] in Canada who reported that urban/rural status was excluded from final multivariate model as they did not show any significant effects in the model.

Regarding feeding pattern, artificial lactation was reported among 26% cases as compared to 16% of control and this difference was not statistically significant (OR=1.85), however there was a 61.9% having gastroenteritis among artificial fed children more than the control. Regarding age at first admission of food in months, most of cases were between 3-6 months old with a mean of 5.18±1.39 for cases and 5.28±0.78 for control group and this difference was not statistically significant. Regarding attendance of nursery, it was reported among 12% of cases as compared to nine percent of control group and this difference was not statistically significant. Regarding current feeding, breast milk and home food were reported among eight percent of cases as compared to seven percent of control and this difference was not statistically significant. Regarding vaccination,

some but not all vaccinations were reported among 10% of cases as compared to eight percent of control and this difference was not statistically significant (OR=1.3). The odds of exposure to incomplete vaccination among cases were 30% more than that among control group.

Regarding effect of feeding pattern, this result agreed with a study by Arifeen et al., ^[17] in slum areas of Dhaka in Bangladesh who reported that breast-fed infants were less vulnerable to diarrhea but infants which were artificially lactated were more vulnerable. Regarding unclean hands as a cause of diarrhea, it was mentioned by 84% mothers of cases and 92% of control group and this difference was not statistically significant. Mothers of control group had better knowledge as compared to mothers of cases. This result agreed with a study by Elsevier, ^[18] who reported that unclean hands is an important cause for diarrhea in children.

Regarding getting rid of flies prevent diarrhea as a cause of diarrhea, 28% of cases gave positive response as compared to 46% among control group and this difference was statistically significant. This result agreed with a study by Curtis et al., ^[19] who reported that getting rid of flies decreased risk of diarrhea in children. Regarding unclean toilet as a cause of diarrhea, among cases, 46% reported unclean toilets as cause of diarrhea compared to 84% among control group. This difference was statistically significant, and this result agreed with a study by Elsevier, 2004 who reported that unclean toilet is an important cause for diarrhea in children.

Regarding washing hands before preparing food and after toilets were significantly different between cases and control. Washing hand before preparing food was reported always among 47% cases which was significantly lower than 89% among control. Washing hands after toilets was always done by 41% of cases and 73% of control group. This result agreed with a study by Elsevier, ^[18] who reported that unclean hands is an important cause for diarrhea in children. Regarding covering food to avoid flies, it was reported always among 38% of cases which was significantly lower than 67% among control group. This result agreed with a study by Curtis et al., ^[19] who reported that getting rid of flies decreased risk of diarrhea in children. Frequency of diarrhea per day was mostly between 4-5 times as reported among 87% of cases. Most of cases had symptoms of foul smelling of stool (98%), undigested food in stool (94%) and mucous in stool (83%). Fewer cases had symptoms of tonsillitis (23%) and fever (21%).

Conclusions

This study identified some possible risk factors of chronic gastroenteritis as: Fathers age >40 years, regarding mothers' job, housewife mothers were risk factor for chronic diarrhea in children and regarding housing, rented housing was a significant risk factor for chronic diarrhea in children.

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Conflict of Interest: Nil

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