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Effect of Probiotic Yoghurt on Management of Antibiotic Associated Diarrhea among Toddlers

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Abstract: Antibiotic agents are the most frequently prescribed medicines in children, but unfortunately, all antibiotics have the potential side of effect of antibiotic associated diarrhea (AAD). AAD is defined as the self-limiting diarrhea that occurs during or following a course of antibiotics. Probiotics are supplements or foods that help in treatment of AAD. The aim of current study was to assess the effect of probiotic yogurt on management of AAD among toddlers with antibiotic therapy. Design: A quasi experimental research design was utilized to achieve aim of the study. Research hypotheses were: toddlers who will eat yogurt in study group will have less frequency, less severity and less duration of AAD than those who will not in control group. *Sample:* a convenient sample of 100 toddlers was included after fulfilling inclusion criteria. Those toddlers (100) were divided equally into 2 constructed groups (50 in study and 50 in control). Setting:this study was conducted in all medicine wards of one of Educational Pediatric Hospital, Cairo University. Tools: there were three tools, which were: a structured toddlers' sociodemographic questionnaire, a structured toddlers medical history and a structured toddlers' AAD record. Results revealed that in the results of the current study revealed that more than two thirds of the study group and more than half of control group were males toddlers and mean age of toddlers in study group was1.04 ± 2.399 year while in control group was 1.80 ±2.204 year. The current study indicated to that there were statistically significant differences between both study and control groups regarding to frequency, degree of severity and duration of AAD. In Conclusion: the current study concluded that probiotic yoghurt was effective in managing AAD. Recommendations: the present study recommended that probiotics yoghurt should be given to toddlers with ADD and replication of such study on a lager and different age group to be able generalize the results of current study.

Key words: Toddlers · Antibiotics · Diarrhea · Probiotics · Yoghurt

INTRODUCTION

Antibiotic agents are the most frequently prescribed medicines in children because acute infectious diseases are prevalent in this age group [1]. Antibiotics continue to be prescribed in large numbers, about 133 million courses of antibiotics are prescribed each year. These are for wide ranging infections, e.g. community acquired pneumonia, etc. There is a variation of specific antibiotic prescribed, depending on presumed infective bacteria, co-morbidities and bacteria sensitivities. Although antibiotics are effective in management of many of diseases in children but unfortunately, all antibiotics have the potential side of effect of diarrhea which puts the patient at risk for antibiotic associated diarrhea (AAD),this risk is increased if the patient has co-morbidities [2].

AAD is self-limiting diarrhea that occurs during or following a course of antibiotics [3, 4]. AAD generally is defined as diarrhea that is correlated with the administration of antibiotics and without another obvious cause. The incidence of AAD, according to most sources, appears to be 5% to 25%, but it has been reported to be as high as 40%, of course, the occurrence of AAD is dependent on the definition ofdiarrhea, the antibiotic agent, the number of daily doses, the duration of treatment, the time from previous antibiotic treatment and host factors. Prolonged or repeated antibiotic treatment or combination antibiotic therapy appears to increase the risk of AAD occurring. The risk increases if the patient is <6 years old, has had AAD in the past, has severe underlying diseases, has chronic diseases of the gastro intestinal system, is immunosuppressed, or is receiving the antibiotics via nasogastric tube [5, 6].

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AAD is unexplained diarrhea occurring between 2 hours to months after staring antibiotic, where diarrhea is defined as more than 2 unformed stools for = 2 days [7]. It is generally accepted that the cause of AAD is exposure to antibiotics, oral or parenteral [8]. Antibiotic treatment may disturb the colonization resistance of gastrointestinal micro flora, which may induce clinical symptoms, most commonly diarrhea. The severity disease to devastating diarrhea with electrolyte disturbances, dehydration, cramp abdominal pain, pseudomembranous colitis, toxic megacolon, or even death may occur [1].

The current treatment for AAD is to stop the prescribed antibiotic [2]. The aim of treatment is to prevent or reverse dehydration and shorten the length of the illness. Treatment options available are oral rehydration solution and gut motility suppressing agents and probiotics [9]. Evidence supports AAD prevention by adding a probiotic to the treatment regime [2].

Probiotics are live microorganisms which when administered in adequate amounts confer a health benefit on the host [10]. Probiotics are supplements or foods that contain a non-digestible food ingredient that selectively stimulates the favorable growth and activity of indigenous probiotic bacteria [11]. Probiotic are supplied in tablets, capsules, liquids and in foods such as yogurt, milk, some juices and soy based products [5]. Well-known probiotics are the lactic acid bacteria. The rationale for using probiotics in AAD is that they act against enteric pathogens by competing for available nutrients and binding sites, making the gut contents acid, producing a variety of chemicals and increasing specific and non-specific immune responses [9].

The nurse practitioner is in a unique position to assess and identify a patient's preventative needs and health promotion outcomes utilizing. In the setting of AAD, prevention and management of the health promoting plan of action should consist of a provider and patient agreement on measures to prevent adverse outcomes related to antimicrobial use, including the role. Nurses' practitioners should be aware of additional preventative and management measures of AAD to assure best outcomes. Given the public's increasing interest in natural remedies and healthcare concern regarding the emergence of drug resistant organisms. Nurses' practitioners should be prepared to discuss the potential benefits and uses associated with probiotics in the prevention and management of AAD [7].

Significance of the Study: AAD occurs in the outpatient setting in up to 30% of children who receive antibiotics. AAD typically develops rapidly after the introduction of antibiotic therapy [5]. Prevalence of AAD is around 11% among children. Type of antibiotics and children younger than 2 years are the two risk factors identified for AAD [7]. AAD can be a serious side effect of antibiotic therapy. AAD remains a health care concern which can lead to complications such as dehydration, debilitating discomfort, incompletion of prescribed antibiotic course, increased cost of care, toxic mega colon and increase mortality rate among children [12]. Beside that rsearch investigator observed that there are several studies which have demonstrated the efficacy of probiotics food for management of AAD among adult, whereas there is lacking of such studies in pediatrics and in addition, the rsearch investigator observed in clinical areas that many children with antibiotics therapy suffer from AAD and its complications, hence the current study wanted to assess the effect of probiotic yoghurt on managing AAD among children to improve child's health through increasing child's tolerance to antibiotics, completion of the antibiotic course, avoid dehydration, decreased mortality rates and less money spent overall on the treatment and management of the child with AAD.

Aim of Study: The current study aims to assess the effect of probiotic yogurt on managing AAD among toddlers.

Conceptual Definition: 1-AAD is diarrhea assoiated with antibiotic therapy and is defined as at least three watery or loose stools /day for a minimum of 2 consecutive days.

Operational Definition

In the Current Study: 1-AAD is considered when child defecates at least three watery or loose stools /day for a minimum of 2 consecutive days. 2-Amount of yogurt/day is only one cup without any food additives (pure milk) which is suitable for toddler.

MATERIALS AND METHODS

Research Design: A quasi experimental research design was utilized to achieve aim of the current study.

Research Hypotheses:

- Toddlers who will eat yogurt in study group will have less frequency of AAD than those who will not in control group.

- Toddlers who will eat yogurt in study group will have less severity of AAD than those who will not in control group.
- Toddlers who will eat yogurt in study group will have less duration of AAD than those who will not in control group.

Setting: This study was conducted in all medicine wards of one of Educational Pediatric Hospital, Cairo University. This hospital provides care for all children patient from all over Egypt and free.

Sample: A convenient sample of 100 toddler was included in the study after fulfilling inclusion criteria. Those 100 toddlers were divided equally into 2 constructed groups (50 in study group and 50 in control group). Determination of sample size was calculated according to statistical procedure known as power analysis of the sample and admission rate of toddlers in the selected hospital which was in 2013 about 400 toddler, according to phenomenon of AAD and power analysis, the size of the sample resulted was 100 toddler.

Inclusion Criteria:

- Toddlers' age 1-3 years
- Toddlers of both sexes
- Toddlers with respiratory diseases
- Toddlers with AAD
- Toddlers have the same protocol of treatment therapy
- Toddlers have no diarrhea to others causes except antibiotic such as gastrointestinal disorders.

Tools for Data Collection: There were three tools utilized in the current study, all tools were developed by research investigator after reviewing related recent literature and experts in pediatrics medicine and nursing, those tools were utilized to collect the required data for the study which were:

- A structured socio-demographic questionnaire: to collect sociodemogaraphic data about toddlers such as age, sex, residence,…..etc. questions were in form of closed ended questions.
- A structured medical history questionnaire: to collect medical data about toddlers, it included 10 questions such as medical diagnosis, type of antibiotic, duration of taking antibiotic, duration of having AAD, ….etc. questions were in form of closed ended questions.
- A structured toddler's AAD record: which used to record frequency of AAD/day, degree and duration of AAD.

Validity and Reliability of Tools: Content validity was done by 5 experts in the field of pediatric medicine and pediatric nursing. As regard reliability of tools, Cronbach's alpha between questions was.870. It is obvious that the alpha value is quite high and the tool is reliable.

Procedure: The study was conducted after obtaining an official permission from hospital director of the Educational Pediatric Hospital, Cairo University. After that research investigator started to collect required data mfrom study group firstly. Research inestigator started by obtained oral and written consents from mothers/relatives of toddlers included in the study after fulfilling inclusion criteria and after an explanation of the aim, tools, benefits and the duration of the study to gain mothers'/relatives' cooperation. The research investigator then started to collect socio-demographic data about each toddler from his/her medical record, collecting required sociodemographic data took about 10-15 minutes for each toddler.

After collecting sociodemographic data research investigator started to collect medical data from toddler's medical record and from mother or relative of toddler and this took about 15-20 minutes for each toddler. After that the research investigator asked and instructed each mother/relative for each toddler who complains of AAD for minimum of 2 consecutive days in study group to give her toddler a cup of yoghurt/day in the morning after taking antibiotic about 1-1:30 minutes for four consecutive days and then to monitor frequency of AAD/day for four consecutive days.

There was a follow up daily from the research investigator with the mother/relative of each toddler by asking her daily face to face or through cell phone to make sure with them that they gave yoghurt to their toddlers and toddler actually ate yoghurt and to assess frequency, severity and monitor duration of AAD and recorded that in each toddler's AAD record for four successive days.

The same steps carried out with mother of each toddler in study group were also carried out with each mother of toddler in control group except the research investigator did not ask/instruct mothers to give their toddlers yoghurt. The present study took about 6 months, as it started from March, 2014 to end of August 2014.

Ethical Considerations: The control group was left to hospital routine of management of their AAD. All mothers in both study and control groups were informed about the purpose, tools and duration of the study after explaining to them the benefits of the study. Oral and written consents of the mothers were gained. The research investigator assured mothers about confidentiality of the data gathered about their toddlers during the study. During the study the research investigator informed the mothers about their right to withdraw their toddlers at any time without any effect on the care provided for their toddlers.

Pilot Study: An initial pilot study was done on 10% hospitalized toddlers to evaluate the content of tools, its objectivity and feasibility and to explain any discrepancies in the tools. The results of pilot study were included in the study.

Statistical Design: Data was analyzed using SPSS statistical package version 20. Numerical data were expressed as mean ±SD. Qualitative data were expressed as frequency and percentage. A comparison between qualitative variables carried out by using parametric Chi square test. A comparison between quantitative variables was done by using non parametric t-test, a comparison between study and control groups for successive days was done by using Anova test of repeated measures, Pearson (r) correlation used to test correlation between variables, and P-value = 0.05 was considered statistically significant and P-value = 0.001 was considered highly statistically significant.

RESULTS

Table 1 explains that more than two thirds of (62%) the study group and more than half (54%) of control group were males toddlers, in relation to mean age of the toddlers the same table indicates that mean age of toddlers in study group was1.04 ± 2.399 year while in control group was 1.80 ±2.204 year. Table 1 represents that half of the sample in study group was from rural area while the highest percentage of control group (56%) were from rural area. Regarding to diagnosis of diseases of toddlers table 1 reveals that the highest percentage of study group (54%) was diagnosed with pneumonia whereas highest percentage (42%) in control group was diagnosed with bronchiolitis.

Concerning to type of antibiotic the same table refers to the highest percentage (34% and 28% respectively), of both study and control groups were taking Rocfine antibiotic. There were no statistically significant differences between study and control groups regarding to sex, age, residence, diagnosis and type of antibiotic of toddlers (χ^2=. 657, t.test=. 521, χ^2=. 361, χ^2= 2.443, χ^2= 12.01, p□0.05, repectively).

Table 2 indicates that mean duration of taking antibiotic in study group was 3.28 ±1.471 days and in control group was 3.06 ±1.219 days. The same table explains that mean duration of appearance of AAD after starting antibiotic was 2.40 ±. 606 days in study group and 2.46 ±.613 days in control group. From table 2, it is clear that there were no statistically significant differences between study and control groups regarding to mean duration of taking antibiotic (t.test=. 814, p□0.05) and mean duration of appearance of AAD after starting antibiotic (t.test=. 492, p□0.05).

Table 3 represents that mean scores of frequency of AAD for four consecutive days in study and control groups after taking yoghurt. It is clear from table 3 that there was no a statistically significant difference between study and control groups regarding to mean frequency of AAD in first day (t. test=.071 p□0.05) whereas there were statistically significant differences between study and control groups regarding to mean frequency of AAD in second, third and fourth days after starting taking yoghurt (F.test= 102.64, p=0.000). It obvious that table 3 proved the first hypothesis of the study.

Table 4 shows degree of AAD for four consecutive days in study and control groups after taking yoghurt, in the first day of the study, the highest percentage (54% and 60% respectively), of study and control groups have moderate degree of AAD with no a statistically significant difference between both groups (χ^2=. 367, p=.545). The same table explains that in the second day most of the study group (84%) had mild degree of AAD and minority (6%) of study group had no AAD, whereas in control group the majority (74%) had moderate degree of AAD and no one had no AAD. Concerning to third day table 4 represnts that more than half of study group (54%) had mild degree of AAD and 46% had no AAD in comparison to control group 44% had mild degree of AAD whereas no one has no AAD. In relation to fourth day, the same table refers that most of the study group (90%) had no AAD in comparison to 20% of control group had no AAD. Table 4 indicates that there were statistically significant differences between study and control groups regarding to degree of AAD in second, third and fourth day (χ^2 = 42.672, χ^2 = 51.510, χ^2 = 66.667, and p = .000 respectively). Table 4 proved the second hypothesis of the study.

It is clear from table 5 that the mean of duration of AAD after starting taking yoghurt was 2.48 ±. 614 days for study group whereas was 3.80±.404 days for control group. It obvious from table 5 that there was a statistically significant difference between study and control groups regarding to mean of duration of AAD after starting taking yoghurt (t. test = 12.697, p = .000). Table 5 proved the third hypothesis of the study.

Table 6 represents that there was no a statistically significant relation between toddler's age, sex and frequency of AAD (r=.013, r=.015, p=.895, p=.465 respectively). There was no a statistically significant relation between toddler's age, sex and duration of AAD (r=.073, r=.017, p=.473 p=.651 respectively). The same table shows that there was a statistically significant relation between frequency of AAD and duration of taking antibiotic (r=.202, p=.044), and there was a statistically significant relation between frequency of AAD and duration of AAD (r=.814, p=.000) and there was a statistically significant relation between duration of AAD and duration of taking antibiotic (r=.386, p=.000).

DISCUSSION

Antibiotics are commonly prescribed in the treatment of children with illnesses such as otitis media, streptococcal pharyngitis, pneumonia, etc. Children are estimated to use three times more antibiotics than adults. While these antibiotics may cure disease, they can result in unwanted side effects like diarrhea [13]. The usual treatment of AAD is to withdraw antibiotics if they are still being taken, which can result in incomplete courses and corresponding difficulties with treating the underlying infection, potentially leading to increased length of hospital stay and costs of care. It has also been shown that hospital patients are at greater risk of future infections and increased mortality [14].

The current study revealed that the majority of toddlers in both study and control groups were males with no a statistical significant difference between both groups regarding sex of toddlers. This results is supported by Hussein and Elsamman, [15] as reported in their study that majority of their study sample was male children.

From point's of view of research investigator this prominence of males toddlers may be return to nature of Egyptian's family especially from rural areas as they give full care and attention to their ill male children and seek medical care for their male children immediately as male child represents for them a big value and their backbone while they may search another sources for treatment their ill female toddlers e.g alternative medicine or drugs from pharmacies and if the condition gets worse seek medical advice.

The mean age of toddlers in study group was 1.04 ± 2.399 year and was a 1.80 ±2.204 year in control group with no a statistically significant difference between both groups regarding to mean of age of toddlers. From the point's of view of the research investigator this may be return to majority of children at this age suffer from low immunity and many of Egyptian's family leave their toddlers without care especially hygienic care which in turn facilitates exposing their children to many of diseases which require taking antibiotics and consequently occurance of AAD.

In relation to residence of toddlers the result of current study showed that half of toddlers in study group and more than half of toddlers in control group were from rural areas with no a statistical significant difference between both groups regarding residence. This result is in congruence with what found by Hussein and Elsamman [15] who found in their study that the majority of their study sample were living in rural area.

From point's of view of the research investigator this may be return to most of the children from rural areas suffers from mal nutritional diseases, other health problems and lack of hygienic care which in turn facilitate occurrence of many diseases which require taking antibiotics and occurance of AAD. At the same time this result reflects burden upon health team in pediatric hospital, Cairo University which receives a big number of children from all over Egypt.

Concerning to diagnosis the majority of toddlers in study group was diagnosed as having pneumonia while the majority in control group were diagnosed as having bronchiolitis with no a statistical significant difference between both groups regarding diagnosis. From point 's of view of the research investigator, this related to nearly all types of lower respiratory diseases are common among this age group because of their immunity system is being low which in turn facilitates exposing toddlers to respiratory diseases which consequently require taking antibiotics and occurance of AAD.

The results of current study revealed that the majority of toddlers in both study and control groups were taken Rocfine antibiotic, with no a statistical significant difference between both groups regarding type of antibiotic. From point's of view of research investigator Rocfine as the most common antibitics given for toddlers

for management of respiratory diseases in the current study that related to most of the antibiotics came to hospital at the time of collecting data were donation and were Rocfine.

The result of current study is in agreement with what was found in a study carried out by Graul *et al.* [16] who reported in their study that broad spectrum antibiotics impart a greater risk for developing AAD, in particular, clindamycin, cephalosporin and fluoroquinolones. Shannon-Lowe *et al*. [17] supported the result of current study as they mentioned that there is no universal agreement on which antibiotics impart greatest risk and any antibiotic may disrupt the colonic micro biota resulting in diarrhea.

The presents study showed that the mean duration of taking antibiotic was 3.28 ±1.471 days in study group and 3.06 ±1.219 days for control group, in relation to mean duration of developing diarrhea after taking antibiotic was 2.40 ±.606 days for study group and 2.46 ±.613 days for control group with no statistical significant differences between both groups regarding to mean duration of taking antibiotic and mean duration of developing AAD.

This result is in congruence with what was reported by Clement [5] who found in his study that AAD typically develops rapidly after the introduction of antibiotic therapy. In addition, Arvola *et al*. [1] reported in their study that gastrointestinal symptoms were reported early during the first 2 weeks after the toddlers beginning of the antimicrobial treatment.

The result of the current study revealed that there was decreasing in mean frequency of AAD among toddlers in study group than in control group as grand mean in study group was 4.510±1.084 times and in control group was 6.110±1.062 times and there was a statistically significant difference between both groups regarding to mean frequency of AAD after giving toddlers probiotic yoghurt.

The result of present study was supported by Rosburg [18] as reported in his study that probiotics yoghurt have health benefits including decreasing frequency of AAD. This result is in accordance with what was found by D'Souza *et al.* [19] and Vanderhoof [20] who confirmed in their studies that co-administration of probiotics food such as yoghurt, etc. reduces the frequency of AAD. Jirapinyo *et al*. [21] also supported the result of current study as they indicated in their study that providing probiotics food as yoghurt to children who are receiving broad spectrum antibiotics showed that the group receiving probiotics had fewer diarrheal episodes than the control group.

In addition, McFarland [22] confirmed the result of current study as he mentioned in his study that several systematic reviews on pediatric AAD that probiotic bacteria in food offer a solution in management of AAD which result in controlling diarrhea episodes and decreasing its frequency and reported that data indicate thatLactobacillusstrains in particular is effective in controlling AAD. Hickson [14] mentioned that yogurt is a common product in which probiotic (Lactobacillus) bacteria can be delivered to the human lower intestine and control episodes of AAD. In addition, Beniwal *et al.* [23] reported in their study that dietary supplementation with yogurt is a simple, effective and safe treatment that decreases the frequency of AAD.

Result of present study is in the same line with Beauchamp [24] who found in his study that the yogurt treated group had much lower rates of diarrhea compared with the control group, of those people who developed diarrhea; the group receiving yogurt had significantly shorter bouts. In addition, Johnston *et al*. [25] found in their study that probiotics are found in yogurts and contain potentially beneficial bacteria or yeast, probiotics effective for preventing, managing and decreasing frequency of AAD and probiotics were generally well tolerated. From point's of view of research investigator decreasing frequency of AAD with eating yohurt returns to yeast in probiotic yoghurt stops destructive action of antibiotic upon normal flora in intestine and restores the natural balance of bacteria in the intestinal tract which in turn decreases frequency of AAD.

Regarding degree of AAD, there were statistically significant differences between both study and control groups from second to fourth days of diarrhea.

The result of current study matches with what was reported in studies had done by Hempel *et al*. [26], Wallace [27], Avadhani and Miley [28] as they found in their studies that there is accumulated evidences state that probiotics food reduce the risk severity of AAD and meta-analysis concludes that probiotics provide a relative severity risk reduction of for AAD. This result also is in congruence with what presented by Apruzzese [29] in his study as he found that probiotics yoghurt that contains sufficient numbers of viable microorganisms to alter the microflora of the host, restore balance to the gut flora and have antibacterial and immune modulatory effects which results in altering severity of diarrhea.

In addition, Olmstead *et al*.[30] reported in their study that ingestion of healthful microorganisms known as probiotics yoghurt is documented to treat and reduce

the risk of AAD and to be an effective treatment for AAD and added that in the future, probiotics such as yoghurt may be seen as an alternative to antibiotics for specific conditions. Jones [13] supported result of current study as he mentioned in his study that probiotics yoghurt modify the microflora of the intestine, which results in antibacterial substances being secreted and then, the probiotics compete with pathogens to prevent adherence to the intestinal epithelium and reduces intensity of AAD and treat it.

From point's of view of research investigator this may be due to yeast in probiotic yoghurt stops destructive action of antibiotic upon normal flora in intestine and restores the natural balance of bacteria in the intestinal tract consecuetively decreases its severety and degree of AAD.

In relation to the mean of duration of AAD after taking probiotic yoghurt in children, mean of duration of AAD in study group was less than in control group and there was a statistically significant difference between study and control groups regarding mean of duration of AAD.

The result of current study is supported by Rosburg [18] who reported in his study that probiotics yoghurt have health benefits including decreasing duration of AAD. This result also is in congruence with what was found in a study carried out by Pashapour [31] who reported that the mean hospitalization days for children with AAD was reduced from 2.7 for controls to 2 days for study and a multicenter and European trial about probiotics in children with acute diarrhea showed a significant reduction in the duration of the disease and in the time of hospital stay in children who received probiotics compared with children who received the rehydration solution with placebo. Also Beniwal *et al.* [23] found in their study that dietary supplementation with yogurt decreases the duration of AAD and significantly less total diarrheal daysin study group than placebo group.

From point's of view of research investigator this may be related to as yeast in probiotic yoghurt stops destructive action of antibiotic upon normal flora in intestine and restores the natural balance of bacteria in the intestinal tract which in turn decreases frequency and severety and consequently decrease in duration of AAD.

The current study refered to that there were no statistically significant relations between toddler's age, sex and both frequency of AAD and duration of AAD.

Result of currnt study is supported by Hamilton *et al.* [6] who found in their study that occurrence of AAD is dependent on the duration of treatment, prolonged or repeated antibiotic treatment therapy appears to increase the risk of AAD occurring. The risk increases if the patient is <6 years old.

The present study indicted to that there was a statistically significant relation between frequency of AAD and duration of taking antibiotic and there was a statistically significant relation between frequency of AAD and duration of AAD and there was a statistically significant relation between duration of AAD and duration of taking antibiotic.

From point's of view of research investigator there were no statistically significant relations between toddler's age, sex and both frequency of AAD and duration of AAD may be related to destruction of intestinal normal flora and mucoa caused by antibiotics therapy does not differentiate between male amd female toddler and young child and older child.

From point's of view of research investigator there was a statistically significant relation between frequency of AAD and duration of taking antibiotic may be related to increase duration of taking antibiotics therapy causes more destruction of intestinal normal flora and mucoa which causes increase frequency and duration of AAD.

CONCLUSIONS

The current study concluded that probiotics yoghurt is effective on management of AAD in toddlers, this manifested by decreasing frequency, degree of severity and duration of AAD among toddlers in study group than in control group and these proved the hypotheses of the current study and achieved the aim of the present study.

Recommendations: Based on the results of the current study, the following recommendations were reached:

Children:

- Probiotic yoghurt should be given to toddlers with antibiotics therapy for management of AAD.
- Probiotic yoghurt should be provided as routine in meals of toddlers and for children in general who are treated with antibiotics therapy.
- Mothrs of children treated with antibiotic therapy should be encouraged to give their children probiotic yoghurt.
- Responsible dietitian in the hospital should be educated and informed about benefits of probiotic yoghurt and provides in diet of children with antibiotics therapy.

- Health education programs should be provided to mothers of children through mass media about importance and effectiveness of probiotic yoghurt in management of AAD.

Nurses:

- Educational program should be provided to nurses to increase and update their knowledge about benefits of probiotics food/yoghurt for management of AAD.

Research:

- Replication of such study on a lager and different age group to be able to generalize the results of current study.
- Replication of such study on toddlers before developing AAD to assess effectiveness of probiotic yoghurt in preventing AAD.

Table 1: Frequency Distribution of Socio-Demographic Characteristics of Toddlers in Study and Control Groups (No=100).

	Study group (No=50)		Control group(No=50)				
Item	No.	%	No.	%	t. test	χ^2	p. value
-Sex of toddlers:							
-Male	31	62	27	54			
-Female	19	38	23	46		.657	.418
Age of children:							
X ±SD	1.04 ± 2.399		1.80 ± 2.204		.521		.604
-Residence:							
-Urban	25	50	22	44			
-Rural	25	50	28	56		.361	.548
-Diagnosis:							
-Bronchitis	5	10	5	10			
-Bronchiolitis	14	28	21	42			
-Pneumonia	27	54	20	40			
-Others	4	8	4	8		2.443	.486
-Type of antibiotic:							
-Rocfine	17	34	14	28		12.010	.284
-Unasin	7	14	6	12			
-Flumox	5	10	13	26			
-Fortum	3	6	5	10			
-Cefobid	3	6	4	8			
-Amikin	1	2	0	0			
- Garamycine	1	2	0	0			
-Vancomycine	2	4	2	4			
-Claforan	2	4	0	0			
-Rocfine,unasin	7	14	2	4			
-Unasin, amikin	2	2	4	8			

Table 2: Mean Differences between Study and Control Groups Regarding to Duration of Taking Antibiotic and Duration of Appearance of AAD among Toddlers (No=100).

	Study group (No=50)	Control group(No=50)		
Item	X ±SD	X ±SD	t. test	p. value
-Duration of taking antibiotic				
X ±SD	3.28 ±1.471	3.06 ±1.219	.814	.418
-Duration of appearance of diarrhea				
X ±SD	2.40 ± .606	2.46 ± .613	.492	.624

Table 3: Comparison between Mean Scores of Frequency of AAD for Four Consecutive Days between Study and Control Groups after Taking Yoghurt by Study Group (No=100).

	Study group(No=50)	Control group(No=50)				
Item	x ± SD	x ± SD	t.test	p-value	F.test	p-value
-Mean of frequency of AAD in 1st day	6.76±1.408	6.74±1.397	.071	.943	102.64	.000*
-Mean of frequency of AAD in 2nd day	5.20±1.069	6.90±1.249	7.310	.000*		
-Mean of frequency of AAD in 3rd day	3.98±.892	6.44±1.072	12.473	.000*		
-Mean of frequency of AAD in 4th day	2.10±.544	4.36±.942	14.686	.000*		
-Grand mean of frequency of AAD	4.510±1. 084	6.110±1.062	69.00	000*		

* Significant at p≤0.05

Table 4: Frequency Distribution of Degree of AAD in Four Successive Days in Study and Control Groups after Taking Yoghurt by Study Group (No=100).

	Study group (No=50)		Control group (No=50)			
Item	No.	%	No.	%	χ^2	p. value
Degree of AAD 1st dayof study:						
No diarrhea	0	0	0	0		
Mild diarrhea	23	46	20	40		
Moderate diarrhea	27	54	30	60	.367	.545
Degree of AAD 2nd day of study:						
No diarrhea	3	6	0	0		
Mild diarrhea	42	84	13	26		
Moderate diarrhea	5	10	37	74	42.672	.000*
Degree of AAD 3rd day of study:						
No diarrhea	23	46	0	0		
Mild diarrhea	27	54	22	44		
Moderate diarrhea	0	0	28	56	51.510	.000*
Degree of AAD 4th day of study:						
No diarrhea	45	90	10	20		
Mild diarrhea	5	10	39	78		
Moderate diarrhea	0	0	1	2	66.667	.000*

* Significant at p≤0.05

Table 5: Comparison between Mean Scores of Duration of AAD between Study and Control Groups after Taking Yoghurt by Study Group (No=100).

	Study group (No=50)	Control group (No=50)		
Item	x ± SD	x ± SD	t.test	p-value
Mean of duration of AAD	2.48±.614	3.80±.404	12.697	.000*

* Significant at p≤0.05

Table 6: Correlation between Toddlers' Age, Sex and Frequency of AAD and Duration of AAD in Study and Control Groups (No=100).

Item	Frequency of AAD	Duration of AAD
Toddler's age	r=.013	r=.073
	p=. 895	p=.473
Toddler's sex	r=.015	r=.017
	p=. 465	p=. 651
Frequency of diarrhea	1	r=. 814
		p=.000*
Duration of taking antibiotic	r=.202	r=.386
	p=.044*	p=.000*

* Significant at p≤0.05

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