Effect of Nutritional Status and Associated Factors on Pneumonia Treatment Outcome among Under-Five Children at St. Paul's Hospital Millennium Medical College, Addis Ababa, Ethiopia

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Abstract: Acute respiratory infection is still a major health problem among under-five children specifically in Ethiopia, where 38% of them are reported as living in the status of under-nutrition. However, there are studies limitation regarding the relationship of nutritional status of under-five children and outcome of pneumonia treatment. Institutional based cross-sectional study design had been employed to see the Effect of nutritional status and associated factors on pneumonia treatment outcome among under-five children in 2015. Data was collected using interview administered structured questionnaires and anthropometric measurement.

The study revealed that high probability of poor pneumonia treatment outcome 26(40%) among exposed groups. Those children to house wife mothers 11(16.92%), smoker family member 6(9.23%), non-fully immunized 9(13.85%), less than 500birr spent for a child 26(40%) are observed to be with poor pneumonia treatment outcome. The risk of poor pneumonia treatment outcome was 4 times and 5 times more like among children who lives with smoker family member and exposed groups respectively. But it was 0.075 and 0.05 times less like among Children from urban and whom their monthly budget is 1000 birr or more respectively.

Child nutritional status has significant effect on pneumonia treatment outcome among under-five children. Undernourishment, smoker family member, rural residency, monthly budget are among factors impact pneumonia treatment outcome. Nutritional education, Mother education, Employing mothers, Budgeting more than 500 birr per child per month, alleviate smoking among the family member, Limiting family members number per house hold, All children should feed colostrums and Full immunization should be done.

Keywords: Nutritional Status, Pneumonia, Treatment Outcome, Children.

1. INTRODUCTION

Childhood mortality rates especially under-five mortality rates are important indicators of health status [1]. One of the targets of the Millennium Development Goals (MDGs) regarding child health is a two-thirds reduction in infant and child mortality between 1990 and 2015 [2].

Worldwide, the rate of under-five mortality has declined steadily from 93 deaths per 1,000 live births in 1990 to 67 in 2007. Regardless of the declining of mortality rate globally, 9.2 million children born alive died before their fifth birthday [3]. Most of these children lived in developing countries mainly in sub-Saharan Africa and Southern part of Asia and the five major causes of child mortality in these countries are pneumonia, diarrhea, malnutrition, malaria, and measles. All can easily be prevented or treated; however, many still died due to one or a combination of these diseases [4].

In Ethiopia, under-five child mortality has substantially declined from 123 per 1,000 live births in 2004/05 to 88 in 2010/11, where 28.4% reduction achieved within the period of five years. However; child mortality due to pneumonia, diarrhea, malnutrition and malaria are still major problems of the country [5].

1.1. Statement of the Problem

Regardless of the steady decline of under-five child mortality; diarrhoea, pneumonia and malaria are still major under-five health problems in Ethiopia. According to the 2011 report of Ethiopian Demographic and Health Survey (EDHS); 43.3% of children under age five showed symptoms of acute respiratory infection (ARI) in the two weeks preceding the survey.

Globally, the nutritional status of under-five children is an important outcome measure of children's health. In Ethiopia, 48% of children less than 6 months old are not exclusively breastfed. Besides, 50% of children at the age of 6-9 months old do not receive complementary foods properly and 96% of children ages 6-23 months old are not fed appropriately based on the recommended infant and young child feeding (IYCF) practices [5]. According to EDHS, 2011 29% of

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E-ISSN: 1929-4247/18

under-five children in Ethiopia are underweight (have low weight-for-age), and 9% are severely underweight.

More than 95% of all new cases of pneumonia in under-five children occur in developing countries and related with increased prevalence of under nutrition [6].

Many studies performed in developing countries, particularly in South America and Asia have shown direct relationships between nutritional status of children and both incidence and mortality because of ARI [7]. Other studies also indicated that hospitalized children 54.5% admitted for infectious diseases [8] and 53% for pneumonia were malnourished [9]. The study done in Indian found out that out of 150 Indian malnourished children under five, 69 of them were affected with pneumonia and both the incidence and severity increases with the severity of malnutrition [9]. However; these studies implied the relation between disease prevalence and nutritional status of children and nutritional status as a determinant of treatment outcome for infectious diseases including pneumonia less addressed in other researches.

In this regard, specifically in Ethiopia, the case of ARI is still a major health problem in under-five children, where 38% of them are reported as living in the status of under nutrition. However, there are studies limitation regarding the relationship of nutritional status of under-five children and outcome of pneumonia treatment.

Therefore; the aim of this study will be addressing the effect of nutritional status of under-five children on the treatment outcome of pneumonia when admitted to Hospitals for the case.

2. METHOD AND MATERIALS

2.1. Study Design, Aim, Area and Period

A cross-section study design had been performed on Effect of nutritional status and associated factors on pneumonia treatment outcome among under-five children at St. Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia from September 1 to November 30, 2015.

2.2. Study Participants

All under-five children who diagnosed for pneumonia and admitted at St. Paul Hospital Millennium Medical College for its treatment, has no any other cases.

2.3. Sample Size Determination

This study assumed the prevalence of under nutrition 50% among under-five pneumonia cases; with 95% certainty, 5% confidence limit, 10% non-response rate and 80% power of detection to calculate required sample size. Then 65 participates were obtained by applying two population proportion formula using EPI.INFO version 7. Because of design effect the calculated sample size was multiplied by 2 and 130 individuals were planned to participate the study with the ratio of non-exposed to exposed 1:1(i.e.65:65).

2.4. Sampling Procedures

Saint Paul's Hospital Millennium Medical College was selected by lottery method among all federal hospitals find in Addis Ababa. Then simple random sampling technique was employed to select under-five pneumonia cases admitted for treatment, to be included as the study subject.

2.5. Operational Definitions

None Exposed

Under-five children with normal nutritional status at admission for treatment of pneumonia

Exposed

Undernourished under-five children at admission for treatment of pneumonia

Good Treatment Outcome

Under-five children with no longer exhibit any new or worsen signs and symptoms of pneumonia, and will be discharged from hospital after the recommended duration of one-two week treatment stay in the hospital.

Poor Treatment Outcome

Under-five children who will exhibit any new or worsen signs and symptoms of pneumonia, and will be in hospital for farther treatments longer than the recommended duration of one-two week treatment of stay in the hospital.

2.6. Data Collection Method

Data was collected using interview administered structured questionnaires and anthropometric measurement (Measurement of Upper Arm Circumference, Weight and Height measurement). The questionnaires were developed based on literature review and adopted from previously used

questionnaires. Based on the standard value for Gomez classification, patients were categorized as exposed group and non-exposed group.

2.7. Data Quality Control

For effective and quality data collection training had been given to the data collectors, pre-test of 20 questioners and daily checking of the collected data for its completeness and consistency. Weight and height were measured with much slight clothes and no shoes.

2.8. Data Analysis

Data had been analyzed by using SPSS version 20.0. Selection and filtration of the comparative groups were applied by splitting into exposed and non-exposed participants alternatively. Crude odds ratio (COR) and adjusted odds ratio (AOR) with 95% CI had been calculated to determine the strength of association between dependent variable and independent variables. P-value less than 0.05 had been be used to see the significance.

2.9. Ethical Consideration

Ethical clearance was obtained from Ethical review committee of University of Gondar and permission letter had been obtain from Saint Paul's Hospital Millennium Medical College administrative office. Then the participants had been informed about the purpose of the study, importance of their participation, full confidentiality, withdraw at any time and written consent had been obtained from parents of under-five pneumonia patients prior to data collection.

3. RESULTS

3.1. Socio Demographic and Economic Characteristics

A total 130 under-five children sick from pneumonia were participated in this study with a response rate of 100 %. Among 130 respondents, 60 of them were from urban while the remaining 70 were from rural area of the country. The Majority 41(68.3%) of children came from urban were in the class of normal nutritional status whereas majorities 46(65.7%) who were from rural area were fund to be under nourished.

The study found that high probability of poor pneumonia treatment outcome among exposed groups. But the probability is observed to be decreased as the level of parent educational status advanced in both exposed and none exposed groups.

Those children to house wife mothers are observed to be with highest probability of poor pneumonia treatment outcome comparing to other occupation. Whereas those to non-governmental employee mothers are with lowest probability of poor pneumonia treatment outcome for both exposed and none exposed pneumonia case children.

All children with poor pneumonia treatment outcome were with less than 500 birr budget monthly. Exposed children how live with smoker family members are observed to be with poor pneumonia treatment outcome than none exposed (Table **1**).

3.4. Pneumonia Treatment Outcome with Maternal Condition of Under-Five Sick Child

It is observed that as the number of children increased pre house hold the probability of poor pneumonia treatment outcome is observed to be increased among both exposed and non exposed children, even though it is higher among exposed groups. Though it is significant, the probability of poor pneumonia treatment outcome among children to mothers with pregnancy, delivery and medical related problems are observed to be less than those how to mothers without the problems. It is revealed that the probability of poor pneumonia treatment outcome among exposed children who not get colostrums is higher than among those non-exposed (Table **2**).

3.5. Pneumonia Treatment Outcome with Special Patient Conditions

Poor pneumonia treatment outcome is more observed among exposed with poor immunization status children than non-exposed with poor immunization status children (Table **3**).

3.8. Factors Associated with Pneumonia Treatment Outcome

This study revealed that nutritional status of under-five children had statistically significant effect on Pneumonia treatment outcome. Poor pneumonia treatment outcome among undernourished children were 4 times higher compared to those unexposed children. The study found that children came from urban were 0.075 times less like to come up with poor pneumonia treatment outcome. The study found out that poor pneumonia treatment outcome is 0.05 times less like among children whom their monthly budget is 1000 birr and more, compared with those children whom their budget is 500 birr or less. The risk of poor

Table 1: Distributions of Pneumonia Treatment Outcome with Socio-Demographic of Participants' Parents at St. Paul Hospital Millennium Medical College from, September 1 to November 30, 2015

Variables	Exposure status			
	Exposed (n=65)		Non-exposed (n=65)	
	Good treatment outcome (39)	Poor treatment outcome (26)	Good treatment outcome (49)	Poor treatment outcome (16)
Education status of mother				
Illiterate	0(0)	7(10.77)	3(4.15)	2(3.08)
Can read and write	3(4.62)	6(9.23)	5(7.70)	2(3.08)
Primary	6(9.23)	6(9.23)	31(47.92)	7(10.77)
Secondary	7(10.77)	4(6.15)	4(6.15)	3(4.62)
Higher level	23(35.38)	3(4.15)	6(9.23)	2(3.08)
Occupation of mother				
House wife	11(16.92)	11(16.92)	11(16.92)	8(12.31)
Self employee	11(16.92)	8(12.31)	13(20)	3(4.62)
Government employee	12(18.64)	3(4.62)	22(33.85)	3(4.62)
Non-government employee	5(7.70)	4(6.15)	3(4.62)	2(3.08)
Source of drinking water				
Pipe	16(24.62)	11(16.92)	37(56.92)	10(15.38)
Unprotected spring	9(13.85)	6(9.23)	3(4.62)	3(4.62)
protected spring	3(4.62)	4(6.15)	0(0)	1(1.54)
Communal	11(16.92)	5(7.70)	9(13.85)	2(3.08)
Money spent for child				
<=500 birr	33(50.77)	26(40)	46(70.77)	16(24.62)
501-999 birr	3(4.62)	0(0)	3(4.62)	0(0)
>=1000 birr	3(4.62)	0(0)	0(0)	0(0)
Family Smoking habit				
Yes	2(3.08)	6(9.23)	6(9.23)	3(4.62)
No	37(56.92)	20(30.77)	43(66.15)	13(20)

Table 2: Shows Maternal Conditions with Pneumonia Treatment Outcome at St. Paul Hospital Millennium Medical College from, September 1 to November 30, 2015

Variables	Exposure status			
Number of children	Exposed (n=65)		Non exposed (n=65)	
	Good treatment outcome (39)	Poor treatment outcome (26)	Good treatment outcome (49)	Poor treatment outcome (16)
1	11(16.92)	2(3.08)	15(23.08)	0(0)
2	10(15.38)	5(7.7)	16(24.62)	4(6.15)
3	9(13.85)	8(12.31)	12(18.46)	6(9.23)
4 and above	9(13.85)	11(16.92)	6(9.23)	8(12.31)
History of Pregnancy problem				
Yes	13(20)	11(16.92)	14(29.4)	6(9.23)
No	26(40)	15(23.08)	35(57.3)	10(15.38)
History of delivery problem				
Yes	2(3.08)	4(6.15)	4(6.15)	3(4.62)
No	37(56.92)	22(33.85)	45(69.23)	13(20)
History of purpurial problem				
Yes	2(3.08)	3(4.62)	1(1.54)	2(3.08)
No	37(56.92)	23(35.38)	48(73.85)	14(21.54)
History of medical problem				
Yes	12(18.46)	6(9.23)	6(9.23)	7(10.77)
No	27(41.54)	20(30.77)	43(66.15)	9(13.85)

Table 3: Show Pneumonia Treatment Outcome with Patient Condition at St. Paul Hospital Millennium Medical College from, September 1 to November 30, 2015

Variables	Exposure status			
	Exposed(n=65)		Non-exposed(n=65)	
	Good treatment outcome N (%)	Poor treatment outcome N (%)	Good treatment outcome N (%)	Poor treatment outcome N (%)
Immunization obtain				
Yes	38(58.46)	22(33.85)	46(70.77)	13(20.00)
No	1(1.54)	4(6.15)	3(4.62)	3(4.62)
Missed immunization visits				
Yes	10(15.38)	4(6.20)	9(13.85)	5(7.70)
No	29(44.62)	22(33.85)	40(61.54)	11(16.92)
Immunization status				
Full immunized	29(44.62)	17(26.15)	37(56.92)	9(13.85)
Not Fully immunized	10(15.38)	9(13.85)	12(18.46)	7(10.77)
Duration of breast feeding				
Till 6 month	10(15.38)	2(3.08)	17(26.15)	2(3.08)
7-12 month	23(35.38)	4(6.15)	20(30.77)	3(4.62)
More than 12 month	6(9.23)	20(30.77)	12(18.46)	11(16.92)
Food taboos				
Yes	2(3.08)	6(9.23)	9(13.85)	7(10.77)
No	37(56.92)	20(30.77)	40(61.54)	9(13.85)
Colostrum feeding				
Yes	37(56.92)	23(35.38)	46(70.77)	14(21.54)
No	2(3.08)	3(4.62)	3(4.62)	2(3.08)
Exclusive Breast Feeding				
Yes	32(49.23)	17(26.15)	43(66.15)	9(13.85)
No	7(10.77)	9(13.85)	6(9.23)	7(10.77)

pneumonia treatment outcome is 5 times more like among children live with smoker family member (Table **4**).

4. DISCUSSION

This study revealed that nutritional status of under-five children had statistically significant effect on Pneumonia treatment outcome. The risks of poor Pneumonia treatment outcome in exposed under-five children were higher compared to those unexposed under-five children.

The finding of this study was in line with the study done on children under-five years old admitted to a hospital in the city of Fortaleza reported Children at nutritional risk, had a greater chance of prolonged hospitalization with an increased incidence of infection, resulting in poor treatment outcome [20]. Also similar finding was reported from the study conducted in Institute of Child Health and Hospital for Children, Chennai.

Under-five children came from rural had higher risk of poor pneumonia treatment outcome when compared to those came urban area. This finding was in line with the study done in Northwest Ethiopia where the majority of under-five children with poor outcome were those who came from the rural [15].

Under-five children to whose family spent low amount of money had greater risk of poor pneumonia treatment outcome when compared to those spent relatively higher amount of birr/month on their baby. Similar finding was reported from the study done in Northwest Ethiopia where average monthly money

Table 4: Factors Associated with Pneumonia Treatment Outcome at St. Paul Hospital Millennium Medical College from, September 1 to November 30, 2015

Variables	Pneumonia treatment outcome		AOR, 95% CI	P-value
	Good(n=88	Poor(n=42)		
Nutritional status				
Exposed	39(60)	26(40)	4 (1.32-12.14)	.015
Non exposed	49(75.4)	16(24.6)	1	
Money spent for child				.000
≥1000 birr	50(84.7)	9(15.3)	.050(.010-.24)	.000
501-999 birr	32(59.3)	22(40.7)		.089
≤500 birr	6(35.3%)	11(64.7)	1	
Severity of pneumonia				.017
Mild	4(36.4)	7(63.6)		.144
Moderate	16(55.2)	13(44.8)	.132(.028-.633)	.011
Severe	45(50)	45(50)	1	
Feeding habit				.000
Good	39(70.9)	16(29.1)	.005(.002-.071)	.000
Moderate	39(62.9)	23(37.1)	.097(.017-.543)	.008
Poor	10(76.9)	3(23.1)	1	
Address				
Urban	39(65)	21(35)	.075(.014-.409)	.003
Rural	49(70)	21(30)	1	
Family smoking				
Yes	8(66.7)	4(33.3)	5(2.1-9.1)	.036
No	80(67.8)	38(32.2)	1	

spent seen significant effect on pneumonia treatment outcome in which the higher spent had good treatment outcome [15].

The study also revealed child feeding habit and severity of the disease at admission had statistically significant effect pneumonia treatment outcome of under-five children. This finding is in line with the study done among children under 5 years old admitted to a hospital in the city of Fortaleza reported good feeding habit had positive effect on pneumonia treatment outcome and disease progression [8].

Severity of the disease showed statistically significant effect on treatment outcome of pneumonia. Severely ill under five children at admission were had high probability to stay in hospital due to poor treatment outcome. The finding of the study is in line with the study done among Children at nutritional risk, had a greater chance of prolonged hospitalization with an increased incidence of infection, resulting in poor treatment outcome [5, 6, 7, 10].

This study revealed under five children to cigarette smoker family member was at higher risk of having poor pneumonia treatment outcome. Different studies done in different areas reported similarly the effect of family smoking in pneumonia treatment outcome [9].

CONCLUSION

Child nutritional status has significant effect on pneumonia treatment outcome among under-five children. Undernourishment, smoker family member, rural residency, monthly budget are among factors impact pneumonia treatment outcome.

RECOMMENDATIONS

- Child nutritional education for all concerned bodies
- Mother education
- Employing mothers

- Budgeting more than 500 birr per child per month is must to be
- Must to alleviate smoking among the family member
- Number of family members per house hold should be limited
- All children should feed colostrums as far as possible
- Child should be fully immunized

ACKNOWLEDGEMENTS

We are very happy to present our deepest gratitude to the data collectors for their patience and honesties to collect qualified data and need to say thank you to all participants for their cooperation.

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Received on 31-08-2018 Accepted on 27-09-2018 Published on 12-11-2018

https://doi.org/10.6000/1929-4247.2018.07.04.9