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Determinants of Upper Respiratory Tract Infection Among the Under Five Children

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Abstract:- Acute respiratory tract infections are among top childhood killer disease. In developing countries, seven out of ten deaths happen due to acute respiratory tract infection in under five-year age group. Most infections (95%) are limited to the upper respiratory tract infections. Determinants of upper respiratory tract infection is an important aspect for providing health education to reduce its burden by the health professionals specially by the nurses working in hospital. The present study is a descriptive type of cross-sectional study carried out among 101 purposively selected respondents both indoors and out patient department of child and ENT department at Combined Military Hospital, Dhaka with the aim to identify the determinants of upper respiratory tract infection cases. In this study, non-probability purposive sampling technique was followed for selection of samples. Data were collected by administering a written semi-structured questionnaire. Out of total 101 respondents maximum age 35 (34.7%) of the children were in between 0-12 months and minimum age 13 (12.9%) of the children were in between 37-48 months. The present study revealed that among all respondent's maximum educational level of respondents 39 (38.6%) were SSC. According to monthly family income, most of the respondents 49 (48.5%) monthly family income were 21000-30000/- Taka. Considering the seasonal variation, most of the children 84 (83.2%) had suffered due to seasonal variation. The present study depicted that most of the children 79 (78.22%) were completed their vaccination according to EPI schedule. It was evident from the present study among the child 48 (47.5%) had a history of other illness. This study depicts that minimum of respondent's family members 23 (22.8%) were smoker. The present study showed that among the URTI cases, there were 11 (10.9%) malnourished children. Our study was designed to identify the determinants of upper respiratory tract infection. This will help in future steps towards the issues of morbidity and mortality aspects of child health.

Keywords:- *URTI, Infection, Micro-organism, Lungs.*

I. INTRODUCTION

Acute Respiratory Tract Infection is one of the commonest causes of death in children in developing countries (DGHS, 2993). The incidence and prevalence of ARIs are a great burden in low and middle-income countries. A large portion of children with respiratory infection attended in health centers. These infections tend to be even more frequent in urban communities than in rural areas. It may be also reflecting a greater health seeking behavior from the urban areas than the rural areas. Respiratory infections include infections in any area of the respiratory tract including the nose, ears, throat (pharynx), voice box (larynx), windpipe (trachea), air passage (bronchi or bronchioles) or lungs. Acute respiratory tract infections include upper respiratory tract infections and lower respiratory tract infections. Upper respiratory tract infections are those primarily affecting the structures above the larynx and those affecting structures below and including larynx are termed as lower respiratory tract infections. Fever is common in acute respiratory tract infections. Fortunately, most children these respiratory symptoms have only a mild infection such as a cold or bronchitis. They suffer from viral infection of the bronchi (bronchitis). They are not seriously ill and can be treated well at home by their families without antibiotics (DGHS,1993).

Transmission of micro-organism can occur by more than one route in an enclosed environment, the chain of transmission is influenced by the ventilation conditions. The airborne transport of micro-organism represents a possible weakly in the infection transmission route. There is where infection control measure may have the greatest chance of breaking infection cycle. Each day our nose warms, filters and humidified around 14,000 litter of air. Proper ventilation can reduce the concentration of air borne pathogens by removing or diluting airborne droplet nuclei (Memarzadeh, 2013).Acute upper respiratory tract viral infections are commonly associated with cold exposure and this may be the origin of the term "Common cold" which implies exposure to cold or a feeling of chilliness and cold.

The effects of cold weather on the transmission and survival of viruses and on crowding and behavior may influence the incidence of URTI in a population. The incidence of URTI is only related to cold air temperature when viruses are free to move around a large population of susceptible host. Breathing cold air will not only chill the nasal airway but also cause some drying of the airway as cold air is dry and will have a drying effect on the airway that may cause upper respiratory tract infections. Breathing cold air especially during exercise when the nasal air flow is increased, will cool and dry the nasal mucosa and act as a nasal irritant. The nasal irritation may lead to acute symptoms similar to common cold with sneezing, nasal congestion and runny nose (Eccles and Wilkinson,2015).

Clinicians and epidemiologist thought that the control of respiratory infections did not deserve high priority because of the difficulties involved in preventing and managing these infections. It was said that antibiotics might not be effective treatment against pneumonia because patients are often weakened by conditions such as chronic malnutrition and parasite infections and that a wide variety of viruses and bacteria are associated with pulmonary infections making it impossible to identify the specific etiological agent in each patient. At most one quarter of the pneumonia cases in children can be prevented by the measles and pertussis vaccines including in the immunization schedule of the Expanded Programme on Immunization (DGHS, 2993).

Information on seasonal variability would be helpful to create an extra awareness among the community health professionals including physician and nurses. Preventive measures including personal, house hygiene, cleanliness and proper ventilation may be adopted across the peak ARI season. Other preventive measures include avoiding crowded public places and making a habit of frequent hand washing etc (Bhuyan et al., 2017).

Incidence of respiratory infections cannot be reduced without an overall increase in social and economic development. But enormous evidences have shown various measures to reduce this disease mortality. Every reduction in death due to ARI would give an incremental benefit toward achieving the Millennium Development Goal (MDG-4). Final step toward control of ARI would be commitment to implement this proven and evidence-based interventions (Selvaraj et al., 2014).

II. LITERATURE REVIEW

In developed countries, during the last hundred years, the evolution of mortality due to Acute Respiratory Infections (ARI) has been dramatic. At high levels of mortality such as 19th century Europe, ARI was the category of diseases making the largest contribution to shortening of life expectancy. Diseases due to ARI represented a loss of 7.5 years of life more than all other infectious diseases (4.8 years) and diarrheal diseases (2.9 years). Among infants and children, ARI was the first cause of death outside the neonatal period. Recognition of pneumonia and other ARI as an important public health problem in developing countries is recent. The magnitude of mortality from ARI in childhood in developing countries was documented and published for the first time in the early 1960s. More recently, the World Health Organization (WHO) and other International Agencies have made ARI one of their priorities for intervention. Increased concern about the important contribution of ARI deaths to overall mortality was raised at the World Health Assembly in 1976. In 1983, a Technical Advisory Group on ARI was established by WHO in Geneva. The global programme for the control of acute respiratory infections was officially initiated in 1984 as a distinct programme under Disease Prevention and Control in WHO's Seventh General Programme of work covering the period 1984-1989. The central objective of the programme is to reduce mortality from ARI, in particularly pneumonia. This objective is endorsed in the Declaration of the World Summit for children, New York, 30 September 1991, which established the goal of reducing by one-third the deaths due to ARI in children under 5years of age during the period 1990-2000. The most recent WHO estimates (for 1990) indicate that out of nearly 12.9 million children under 5 who die each year in developing countries, about 4.3 million die of ARI. Of these, it is estimated that 0.8 million (18.6% of all ARI deaths) occur in the first month of life. Other estimates have indicated that about two-thirds of ARI deaths occur in the first month of life. The WHO estimates further state that the ARI complications of measles accounted for 0.48 million deaths (11% of ARI deaths and 55% of all measles death) and that the ARI complications of pertussis accounted for 0.26 million deaths (6% of ARI deaths and 72% of all pertussis deaths). Thus, ARI was estimated to be a single largest cause of death in young children, being associated 33% of all childhood deaths in developing countries (Garenne et al., 1993).

2.1 International Studies:

Globally every minute 21 children die before reaching age five due to various infections which accounts for 30,000 children per day among these deaths 90% are due to ARI. According to UNICEF, it is estimated that about 90% of children die at home every year due to lack of facilities. WHO has set the target for reduction of global under five mortality from 93/1000 in 1990 to 15/1000 children by the end of 2015. By the global scenario for under five mortality, ARI stands at 52nd rank (Peerapur, 2008).

The present community based, cross sectional study was carried out among children under 5 year of age residing in urban and rural field practice areas covered under department of community medicine, Melmaruvathur, Adhiparasakthi. Institute of Medical Science and Research, Melmaruvathur, Kancheepuram, Tamil Nadu, South India, the study population consisted of 500 under five children. A total of 500 under five children was surveyed for the study. It was observed that, majority of the age group 14 years followed by infants. About

159 were living in katcha house rest 341 in paccha and semi-paccha houses. Overcrowding was present in 209 of the houses and cross ventilation was inadequate in 295 of the households. 50% of the households use smokeless fuel for cooking. Purposes and history of parental smoking was present in 240 of the households. About 22.8% of children were in low birth weight category. Majority 460 of children were completely immunized according to their age. Malnutrition was noticed in 137 of children (Melmaruvathur, 2010).

A study conducted by Florey C du V, Melia R J W *et al*. and they examined the relation between lung function and respiratory illness in a population of 808 primary school children aged 3-5 years and the levels of nitrogen dioxide in the kitchens and bedrooms in their homes. Complete data were collected on about 66% of the population. The children lived in a defined 4 square km area in Middlesbrough, Cleveland, UK. One-week average outdoors levels of nitrogen dioxide varied little over the areas (14-24 ppb). The prevalence of respiratory illness was higher in children from gas than electric cooking homes (p-0.1). Although prevalence was not related to kitchen Nitrogen Dioxide levels (range 5-317 ppb) it increased with increasing levels of Nitrogen Dioxide in the children's bedrooms in gas cooking homes (ranges 4-169 ppb, p-0.1). Symptoms in siblings and parents were not related to kitchen Nitrogen Dioxide levels. Lung function was not related to Nitrogen Dioxide at which an associated with illness was observed and the inconsistency between our results in the UK and those from several studies in the US, it is possible that the Nitrogen Dioxide levels were a proxy for some other factor more directly related to respiratory disease such as temperature or humidity (Florey et al., 1979).

To evaluate the seasonal trends of viral respiratory tract infections in a tropical environment, a retrospective survey of laboratory virus isolation, serology and immune fluorescence microscopy in large two general hospitals in Singapore between September 1990 and September 1994 was carried out. Respiratory tract viral out breaks particularly among infants who required hospitalization, were found to be associated mainly with respiratory syncytial virus (RSV) infections (72%), influenza (11%) and para-influenza viruses (11%). Consistent seasonal variations in viral infections in viral infections were observed only with RSV (March-August) and influenza A virus (peaks in June, December- January). The RSV trends were associated with higher maximum day – to-day temperature variation. Although the influenza A outbreaks were not associated with meteorological factors, influenza B isolates were positively associated with rainfall. These data support the existence of seasonal trends of viral respiratory tract infections in the tropics (Chew et al., 1998).

2.2 National Studies:

Respiratory tract infections are a frequent problem for children, families and pediatricians. From a study of Bangladesh Bureau of Statistics, it was found that the families of more than 5 members were 42.0%. This roughly corresponds to 4.8 per households as slated in population date 2010 (Statistics BB, 2015).

This study was undertaken to determine the prevalence and risk factors of the disease among under five children in a rural community. Three villages were randomly selected from the Ghoraghat Thana of Dinajpur District. All under the children were followed once a month for consecutive four months and all the target variables were checked and recorded in the questionnaire. 566 out of the total of 965 under five children had ARI episode during the study period. The prevalence of ARI in the community was 58.7%. However, the incidences in both sexes were 14.7%. It was 14.9% and 14.4% in male and female respectively. The mean number of episodes of ARI was 1.75 per child per year. Among studied risk factors malnutrition (62% vs. 37%), illiteracy (64% vs. 36%), poverty (62% vs. 38%), overcrowding (62% vs. 38%) and parental smoking (61% vs. 39%) were found in significantly higher proportions in ARI victims compared to those without ARI. These observations emphasize the need for research aimed at health system to determine the most appropriate approaches to control acute respiratory infection and thus could be utilize to strengthen the ARI control programme (Rahman et al., 1997).

III. METHODS AND MATERIALS

3.1 Study place

The study was carried out indoors and out patient department of child and ENT department at CMH, Dhaka cantonment. CMH Dhaka is the largest tertiary level military hospital in our country. In the pediatric ward children are admitted for special observation and care during their illness and also for treatment of URTI. Availability of children mother made this hospital a good choice for conduct this study. Moreover, it is within the Dhaka cantonment and nearer to AFMI, for which it is convenient for the researcher to conduct this study. This is also an educational and research institute. The study was conducted from July 2018 to December 2018. This study population was under five children with URTI cases attending at Combined Military Hospital, Dhaka.

3.2 Research Instruments

A semi-structured questionnaire was formulated and this questionnaire was used for data collection. These questionnaires were pretested among under five children with URTI attending at Kurmitola General Hospital, Dhaka. Then a set of questionnaires was finalized for data collection. The instrument was prepared on the basis of variables that implicit in the objectives.

3.3 Data collection procedure

Ensuring and explaining the purpose of the study to the respondent's and obtaining verbal consent, the Novice researcher face to face interviewed respondent's by asking question in Bengali. It was made clear to the respondent's that they were at full liberty to answer any question or not. They were given complete assurance on some ethical points of the view that under no circumstances, finding to the study will be disclosed to any unauthorized person or anybody except for the purpose of the study.

3.4 Data processing and analysis

Each questionnaire was checked for its completeness, correctness and internal consistency to exclude missing or inconsistent data after interview. All the data were checked and edited then coded and analyzed by using 'Statistical Package for the Social Sciences (SPSS) version 23'. By the researchers herself an analysis plan was developed keeping in view with the objective of the study. Data was presented in tables, graphs and charts. Mothers of under five children.Under five children.

3.5 Ethical implication

The study needed to collect some personal information from the respondents. So, before collection of data and explanation was need to respondent about the purpose of the study. Informed consent was taken from the respondents. The respondents had the right to refuge and withdrawn herself from the study at any time. Confidentiality of the respondent was maintained. Due to importance was given on ethical aspect. It was ensuring that respondent's physical, mental and social harm will not be done.

IV. RESULTS

This descriptive cross-sectional study was done among the 101 children who attended for treatment in the indoors and out patient department of child and ENT department of CMH Dhaka. The aim of this study was to identify the determinants of upper respiratory tract infections among the under five children, to assess the immunization status of the under five children and to find out the sociodemographic characteristics of the respondents. This study was aimed also to find out the environmental conditions of household such as ventilation facilities, sanitation, family size and smoking and also to find out selected socio-demographic conditions of the children. Data were collected, analyzed and processed using the appropriate statistical procedures (SPSS version 23) and presented in this chapter through tables, charts and graphs to find out whether there was any relationship present between disease profile. All the findings are presented as follows:

- Information related to socio-demographic characteristics.
- Information related to determinants of upper respiratory tract infection.
- Information related to immunization status.

Table 4.1. Distribution of children by age (n= 101).

Age group of the children (in months)	Frequency	Percent
0-12	35	34.7
13-24	23	22.8
25-36	13	12.9
37-48	13	12.9
>49	17	16.8
Total	**101**	**100.0**
Mean, ± SD = 26.80, ± 20.698 months		

Table 4.1. shows that maximum 35(34.7%) were within the age group of 0-12 months, followed by 23(22.8%) were within the age group of 13-24 months, 17(16.8%) were within the age group of > 49 months, 13(12.9%) were within the age group of 25-36 months and 13(12.9%) were within the age group of 37-48 months. The mean of children age is 26.80 with SD ±20.698 months.

Table 4.2. Distribution of respondent's by family income (n=101).

Family income of the respondent's	Frequency	Percent
10000-20000	26	25.7
21000-30000	49	48.5
31000-40000	13	12.9
41000-50000	8	7.9
51000-60000	5	5.0
Total	**101**	**100.0**
Mean, ±SD = 28619.36, ±10692.78/- Taka		

Table 4.2 shows that most of the respondent's 49(48.5%) monthly family income were 21000-30000/- Taka, 26(25.7%) respondent's income were 10000-20000/- Taka, 13(12.9%) respondent's income were 31000-40000/- Taka, 8(7.9%) respondent's income were 41000-50000/- Taka and 5(5.0%) respondent's income were 51000-60000/- Taka. The mean of the respondent's family income is 28619.36 with SD ±10692.78/- Taka. Figure 4.1. Distribution of the respondents by their educational status (n=101).

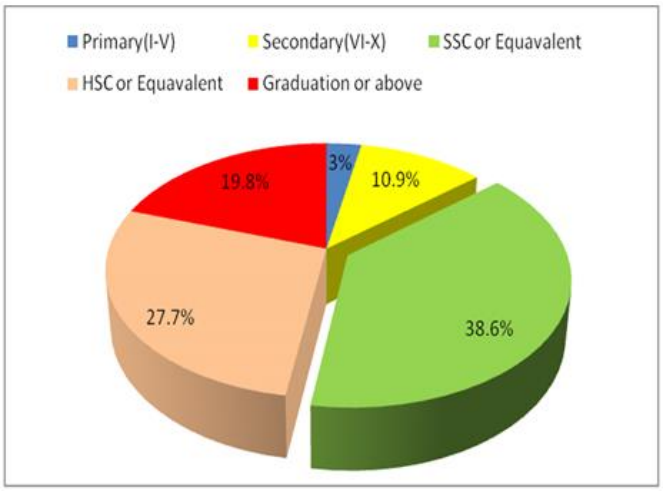

Fig 1:- Depicts that most of the respondent's 39(38.6%) were SSC or Equivalent and rest 28(27.7%) were HSC, 20(19.8%) were graduate, 11(10.9%) were secondary and 3(3%) were primary.

Table 4.3. Distribution of respondent's house by ventilation facilities (n=101).

Ventilation facilities of the respondent's house	Frequency	Percent (%)
Well ventilation	95	94.1
Poor ventilation	6	5.9
Total	**101**	**100.0**

Table 4.4. Distribution of children health affect by seasonal variations (n=101).

Seasonal variation affects the children health	Frequency	Percent
Yes	84	83.2
No	17	16.8
Total	**101**	**100.0**

Table 4.4. shows that most of the children 84(83.2%) had suffered due to seasonal variations and rest 17(16.8%) had not suffered due to seasonal variation.

Table 4.5. Distribution of children by suffering from malnutrition (n=101).

Children suffer from malnutrition	Frequency	Percent
Yes	11	10.9
No	90	89.1
Total	**101**	**100.0**

Table 4.5. shows that most of the children 90(89.1%) were not suffering from malnutrition and rest 11(10.9%) were suffering from malnutrition.

Table 4.6. Distribution of respondent's family member by smoking habit (n=101).

Smoking habit of the family members	Frequency	Percent
Yes	23	22.8
No	78	77.2
Total	**101**	**100.0**

Among the respondent's family members 23(22.8%) were smoker and rest 78(77.2%) were not smoker, Table 4.6.

Table 4.7. Distribution of children by history of other illness (n=101).

History of other illness of the children	Frequency	Percent
Yes	48	47.5
No	53	52.5
Total	**101**	**100.0**

Table 4.7. represent that among the children 48(47.5%) had a history of other illness and rest 53(52.5%) had no history of other illness.

Table 4.8. Distribution of children by selected immunization status (n=101).

Selected immunization status	Frequency	Percent
Complete	79	78.22
Incomplete	22	21.78
Total	**101**	**100.0**

Table 4.8. shows that most of the children 79(78.22%) were completed their vaccination according to EPI schedule and rest 22(21.78%) didn't complete their vaccination.

V. DISCUSSION

This descriptive type of cross-sectional study was designed to identify the determinants of upper respiratory tract infection among the under five children attending at Combined Military Hospital, Dhaka, to assess the immunization status of the under five children and to find out the socio-demographic characteristics. Total 101 children with upper respiratory tract infection were selected purposively.

In this study among the 101 under five children (52.48%) were male and (47.52%) were female. But a study was conducted by Rahman *et al*.[26] in three villages from Ghoraghat upazilla of Dinajpur district, the prevalence of ARI in the community was (58.7%), incidence was (14.9%) in male and (14.4%) in female where male and female percentage of sufferings are almost similar. But in our study incidence were dissimilar may be due to more male child is suffering from URTI. This study showed that maximum age (34.7%) of the

children were in between 0-12 months of age, (22.8%) children were in between 13-24 months of age, (16.8%) children were in between >49 months of age, (12.9%) children were in between 25-36 months of age and (12.9%) children were in between 37-48 months of age. As (0-12 months of age) are more vulnerable to URTI, proper take care should be done during this age.

The present study revealed that among all respondent's maximum educational level of respondent (38.6%) were SSC, (27.7%) were HSC, (19.8%) were Graduate or above, (10.9%) were Secondary and (3%) were primary. From the present study, it may mention that low level of respondent's education mostly responsible for URTI. It was evident from the present study that half of the respondents (50.5%) living rooms were 2, (31.7%) respondents living rooms were 3, (13.9%) respondents living rooms were 4, (3.0%) respondents living rooms were 1, (1.0%) respondents living rooms were 5. In our study, we found that overcrowding in living room may be responsible for URTI.

Among the respondent (94.1%) had well ventilated house and (5.9%) had poor ventilated house. It was evident from the present study among the children (47.5%) had a history of other illness and rest (52.5%) had no history of other illness. So, the situation is not might be similar than the previous study. This present study revealed that most of the respondent's type of burners (93.07%) use for cooking were gas and (6.93%) use for cooking were wood. But a study carried out by Florey C du *et al*.[22] in a defined 4 square Km area in Middlesbrough, Cleveland, UK where the peak prevalence of respiratory illness was higher in children from gas than electric cooking homes. It may be mentioned here that the number of burners use for cooking wood were negligible in our study place which is also reflected in this study.

Considering the seasonal variation, most of the children (83.2%) had suffered due to seasonal variation and rest (16.8%) had not suffered due to seasonal variation. But in September 1990 and September 1994 a study was carried out by FT Chew, S Doraisingham, AE Ling, G Kumarasinghe, BW Lee (Chew et al.,1998). In Singapore showed that respiratory tract viral outbreaks, particularly among infants who required hospitalization, were found to be associated mainly with respiratory syncytial (RSV) infections (72%), influenza (11%) and parainfluenza viruses (11%). Because of consistent seasonal variations in viral infections were observed only with RSV (March- August) and influenza A virus (peaks in June, December- January). So, the study period is might be similar to this present study. In that case, the respondents should be more conscious about their child health in pre-winter season. In this study showed that most of the child(89.1%) were not suffering from malnutrition and rest (10.9%) were suffering from malnutrition that may cause upper respiratory tract infection.

This present study revealed that most of the children (78.22%) were completed their vaccination according to EPI schedule and rest (21.78%) didn't complete their vaccination. At least one quarter of the pneumonia cases in the children can be prevented by vaccination against measles and pertussis according to EPI report. From the above discussion it may be mentioned that Upper Respiratory Tract Infection (URTI) is a multi-factorial disease. In the recent year the GOVT. of the Peoples Republic of Bangladesh, under the technical and financial support of WHO, UNICEF and World Bank has adopted National ARI program for the purpose of control and proper management of ARI under five children. The main objective of URTI in the study were to identify the determinants (such as; Smoking habit of family members, seasonal variation, associated other illness, type of burners use for cooking, ventilation facilities, overcrowding, toilet facilities, low birth weight and malnutrition) of URTI among the under five children, to assess the (complete or incomplete) immunization status among the under five children and to find out the socio-demographic characteristics of the respondents. So, these factors are might be associated with the causation of URTI among the under five children.

VI. CONCLUSION

The study has given an impression about the determinants of upper respiratory tract infection among the under five children attending at CMH, Dhaka cantonment, Dhaka. The depicted results and discussion in the preceding chapters clearly indicates that the survey of 101 children attempted to understand the determinants of upper respiratory tract infection. Upper respiratory tract infection recognized as a common problem among the under five children in our country. The smaller number of URTI in CMH Dhaka is due to better service facilities, better socio-demographic condition eg. better educational qualification, family income, housing condition. And also, well ventilated house, better lighting facility in the house, a smaller number of smoking habit of family members in the house, better toilet condition, less number of low birth weight baby, less number of malnourished baby and also well immunization status. But it does not definitely reflect the situation in other hospitals, other area such as slums of our country, where the patient load is very high, facilities are minimum, polluted environmental condition and overcrowding are sustained.

Based on the present study, maximum of the URTI children affected by seasonal variation 84 (83.2%), other illness 48(47.5%), smoking habit of the family members 23(22.8%), low economic status, type of burners uses for cooking gas 94(93.07%) and malnutrition. It is hoped that present study will undoubtedly helping identifying the determinants of upper respiratory tract infection cases. From this study the finding might be useful basis for recognizing the problem existing in the society and for future research on upper respiratory tract infection.

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- *AVAILABILITY OF DATA AND MATERIALS*
  Not applicable.

- *CONSENT FOR PUBLICATION*
  The authors declare their consent for publication.

- *COMPETING INTERESTS*
  The authors declare no conflicts of interest.

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