Clinical manifestations of upper respiratory tract infection in children at Kalideres Community Health Center, West Jakarta

Widagdo*, Harmon Mawardi*, Ellen P. Gandaputra*, Firda Fairuza*, Rudy Pou*, and Paul Bukitwetan**

ABSTRAK

INTRODUCTION
The National Household Health Survey showed that the incidence of upper respiratory tract infection (URI) in Indonesia was high. The objectives of the study were to investigate the clinical manifestations of URI, its bacterial spectrum and sensitivity.

METHODS
A cross sectional study was carried out involving one hundred children with symptoms of URI i.e. fever, cough and or runny nose. The data of demography, physical sign, hematology, bacterial spectrum and sensitivity were collected.

RESULTS
The prevalence of URI was higher in male, younger age, smoker family, low educated, low income family, and polluted environment. The manifestations of URI were rhinopharyngitis (52%), pharyngitis (18%), rhinitis (12%), tonsilopharyngitis (10%), and tonsillitis (8%). The isolated bacteria were S. aureus, S. β hemolyticus, K. pneumoniae, C. diphtheriae, S. albus and S. anhemolyticus. S. aureus was higher in male than in female (p<0.01), while S. aureus, S. á hemolyticus, and C. bacterium diphtheriae were higher in preschool age children (p<0.01), and K. pneumoniae were higher in infants (p<0.01). S. aureus, and S. á hemolyticus were higher in children with under-nutrition, while in normal nutrition were of K. pneumonia and C diphtheriae (p<0.01). Most bacteria were intermediate and resistant to fourteen tested antibiotics.

CONCLUSION
The manifestations of URI were rhinopharyngitis (52%), pharyngitis (18%), rhinitis (12%), tonsilopharyngitis (10%), and tonsillitis (8%), each of which could be associated with the complication and accompanying disease. The pathogenic bacterial spectrum of the throat consisted of S. aureus, S. á hemolyticus, K. pneumonia, and C. diphtheriae.

Keywords: URI, children, clinical manifestations, bacterial sensitivity tests
Manifestasi klinis infeksi saluran nafas atas pada anak di Pusat Kesehatan Masyarakat Kalideres, Jakarta Barat


LATAR BELAKANG
Survei Kesehatan Rumah Tangga (SKRT) tahun 2001 menunjukkan angka kejadian infeksi saluran nafas atas (ISNA) di Indonesia adalah tinggi. Penelitian ini dilakukan untuk mengetahui manifestasi klinis ISNA serta bakteri usap tenggorok berikut uji sensitivitasnya.

METODE

HASIL
Kejadian ISNA pada anak terdapat lebih banyak pada anak laki, usia lebih muda, keluarga perokok, pendidikan rendah, kondisi ekonomi kurang, dan lingkungan berdebu. Keluhan dan temuan fisik adalah demam, batuk, pilek, anoreksi, muntah, diare, sesak nafas, dan kejang. Manifestasi ISNA meliputi rinofaringitis (52%), faringitis (18%), rinitis (12%), tonsilofaringitis (10%) dan tonsilitis (8%). Penyakit penyulit dan penyerta antara lain otitis media, pneumonia, gizi-kurang, dan anemia. Hasil biakan menunjukkan *S. aureus* terdapat lebih banyak pada anak laki dari perempuan (p<0,01), sedang *S. aureus, S. á hemolitikus, dan K. difteri* terdapat lebih banyak pada usia prasekolah (p<0,01). Sebaliknya *K. pneumonia* ditemukan lebih banyak pada bayi (p<0,01). *S. aureus dan S. á hemolitikus* didapatkan lebih banyak pada anak gizi kurang, sedang *K. pneumonia* dan *K difteri* lebih banyak pada anak gizi baik (p<0,01). Kuman memperlihatkan tingkat intermediate dan resisten terhadap 14 jenis antibiotik yang diuji.

KESIMPULAN
Manifestasi klinis ISNA terbanyak adalah rinofaringitis (52%), faringitis (18%), rinitis (12%), tonsilofaringitis (10%) dan tonsilitis (8%).

Kata kunci: ISNA, anak, manifestasi klinis, uji resistensi bakteri

ABSTRACT

INTRODUCTION

The prevalence of upper respiratory tract infection (URI) in Indonesia was 38.7% in infant, for under-five it was 42.2%, and 28.8% in children of 5 up to 14 years of age.(1) URI is an acute infections involving the nose, paranasal sinuses, pharynx, larynx, trachea, bronchi, acute
laryngotracheo-bronchitis (croup), epiglottitis, and otitis media.\(^\text{(2,3)}\) These infections occur most common at about seven times per year among children and fall to two times per year in adult. Assuming that each episode last about 4 days, then a 70 year old people may have spent about 1-2 years suffering from URI.\(^\text{(4)}\) URI do not contribute significantly to deaths in children, but they cause considerable burden of disability.\(^\text{(2)}\) The symptoms and signs of URI can be classified by the side from which symptoms originate and their functional effects. Thus the clinical pictures vary as does the site of the initial infection, but in some cases with URI may develop serious infections such as meningitis or pneumonia.\(^\text{(4)}\) As widely reported, the most cause of URI is virus,\(^\text{(5,6)}\) and the others are streptococci some of which are group A S. pyogenes, C. diphtheriae, N. gonorrhoeae, Fusobacteria spp. and Spirochaetes, and Chlamydia pneumoniae.\(^\text{(6)}\)

Since the causes of URI are vary and the microbiological confirmation of diagnosis takes time, while the clinical course of the disease takes a relatively short period thence the problem arise is the establishment of diagnosis needed to treat the URI.\(^\text{(4)}\) As the impact of such situation is the occurrence of antibiotics overused with its bacterial resistant\(^\text{(2)}\) and other untoward effects such as development of eczema, wheeze, and allergic sensitization\(^\text{(7)}\) that are difficult be hindered. The attempt of this study about URI was to investigate the clinical picture of URI including the bacterial spectrum of throat swab and its sensitivity to antibiotics.

**METHOD**

**Research design**

A cross sectional design was carried out at Kalideres Community Health Center in West Jakarta from 29 July 2003 to 9 October 2003.
Laboratory examinations

The hematology examinations were performed at the Laboratory Division of Kalideres Health Center, while microbiology examinations were carried out by the staffs of Microbiology Department supervised by PB. Throat swabs were taken by scratching the tonsils and the posterior wall of the pharynx using sterile cotton buds, and avoided touching mucous membrane of the mouth. The specimens were put into the tube containing Cary Blair transport media. The tubes containing specimens were collected in a bag containing dry ice, then directly dispatched to the Department of Microbiology for culture. Upon the receipt, the specimen was directly inoculated onto blood agar plate then was incubated in a candle-jar at 35°C for 24-48 hours. The colony grew on the blood agar plate was selected and identified according to the standard culture system.(13) The antibiotics sensitivity was determined by using of the disc diffusion method and the interpretation were made according to the criteria described by the National Committee for Clinical Laboratory Standards (NCCLS).(14)

Statistical analysis

With the use of Microsoft Excel of Windows XP (2003) the relevant variables were totaled and converted to the percentage of the size of respective samples. The different of distribution of bacteria according each to gender, age, and nutrition were tested with the use of Chi square test with p < 0.05 as the significant level.

Ethical clearance

The participants were enrolled for the study with informed consent signed by their parents. The study will be initiated after the ethical clearance has been issued by the Ethical Committee of Trisakti Medical Faculty.

RESULTS

During three months of the study a total sample of 100 children with URI visited the health center were enrolled. There were 19 patients refused the blood examinations. Demographic characteristic was listed in Table 1, mentioning such as gender of 58 boys and 42 girls, average age in month was 39 ± 31 (4-120 months) with the distribution as 21 infants, 57 preschool age, and 22 school age children, and the parents had low in education and social economy level.

Table 2 depicted the symptoms and signs such as fever, cough, runny nose, measurements, and upper respiratory findings. The study of hematologic value in 81 cases showed that the hemoglobin (g/dl) were 11.2 ± 1.0 (8.7-13.2) and prevalence of anemia was found 13.6% (11/81), mean white blood cells (10³/dl) was 11.3 ± 4.9 (4.9-31.6) and the white blood cells of 10x10³ or higher was found in 19% of cases, increased polymorphonuclear cells (PMNC) in 32%, and high mononuclear cells (MNC) in 54%. The erythrocyte sedimentation rate (ESR) (cm/1 hr) was 20.1 ± 9.4 (1-50), and the ESR higher than 10 was seen in 77% of cases.

Table 1. Demographic characteristics of the patients (n = 100)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number of finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male (%)</td>
<td>58</td>
</tr>
<tr>
<td>Female (%)</td>
<td>42</td>
</tr>
<tr>
<td>Child age (mo)</td>
<td>39 ± 31 (4-120)</td>
</tr>
<tr>
<td>Infant (%)</td>
<td>20</td>
</tr>
<tr>
<td>Preschool age (%)</td>
<td>58</td>
</tr>
<tr>
<td>School age (%)</td>
<td>22</td>
</tr>
<tr>
<td>Child number</td>
<td>2 ± 1 (1-6)</td>
</tr>
<tr>
<td>Family size</td>
<td>5 ± 2 (3-12)</td>
</tr>
<tr>
<td>Total children</td>
<td>2 ± 1 (1-7)</td>
</tr>
<tr>
<td>Education (y)</td>
<td></td>
</tr>
<tr>
<td>Father</td>
<td>9 ± 3 (0-12)</td>
</tr>
<tr>
<td>Mother</td>
<td>8 ± 3 (0-15)</td>
</tr>
<tr>
<td>Monthly income (IDR 000)</td>
<td>544 ± 292 (100-1800)</td>
</tr>
<tr>
<td>Income per capita (IDR 000)</td>
<td>135 ± 91 (11-600)</td>
</tr>
</tbody>
</table>
Table 3 showed the URI’s manifestation such as rhinopharyngitis 52%, the complication and accompanying diseases like pneumonia (3%), otitis media (2%), and under-nutrition was 49%.

Table 4 presented the bacterial spectrum of the throat consisted of S. aureus, S. α hemolyticus, K. pneumonia, and C. diphtheriae. Distribution of bacteria showed that S. aureus were higher in male than in female (p<0.01), while S. aureus, S. α hemolyticus, and C. bacterium diptheriae were higher in preschool age children (p<0.01), on the other hand K. pneumoniae were higher in infants (p<0.01). (Data not presented).

Table 5 showed the sensitivity of four pathogenic bacteria to 14 antibiotics being tested, and it showed that the bacteria were intermediate and resistant to all drugs, except C. diptheriae which was sensitive to amoxicillin-clavulanic acid, cefadroxil, cefixime, and cotrimoxazol.

DISCUSSION

This study showed that URI mainly occurred in boys than girls with the male-female ratio of 3:2, and the age of the children mainly were of preschool age, followed by school age and infant in the percentage of 57%, 22%, and 21%, respectively. Some studies have documented that boys had more URI than did girls and the highest age incidence was 6-23 mo. (15) Kvaerner (2000) in Oslo reported that
URI were common at 4 years old,\(^{(16)}\) while other study also in Oslo showed that URI was common in children of 10 years of age.\(^{(17)}\) The factors that influenced the occurrence of URI in our studies were under-nutrition (49%), anemia (14%), large family size (65%), smoker family (74%), low level of education (73%) and low social economy (64%). Studies in various country showed the predisposing factors of the evidence of URI were large family size, malnutrition, genetic such as Down syndrome, and overcrowding,\(^{(4)}\) parental smoking,\(^{(4,15)}\) young age,\(^{(4,15,19)}\) pollution,\(^{(4,18)}\) low birth weight,\(^{(4,19)}\) African/Asian ethnicity and home dampness,\(^{(16)}\) atopic disease,\(^{(16,19)}\) and sharing bedroom with adult.\(^{(17)}\)

Clinical presentation of URI depends on the site of the initial infection and the response of the mucosa such as simple necrosis that causes dryness, pain, and bleeding of the overlying vascular tissue, and the other possible response is over-secreting mucous afflicting sniffles, congestion, facial aching, and reduced hearing; the systemic symptoms may be related to direct pathogenic effects on skeletal muscles, or indirectly from metabolites of the immune response.\(^{(4)}\) In accordance with the pathogenesis as stated by del Mar (2000),\(^{(4)}\) this study noted the clinical symptoms and signs were fever (100%), cough (97%), runny nose (87%), anorexia (63%), vomiting (34%), diarrhea (10%), dyspnea (2%), and convulsion (3%). The clinical signs were nasal secretion found in 52%, enlarged tonsil in 65% and hyperemic in 59%, and pharyngeal hyperemia in 50% of cases. Then clinical manifestations of URI were as rhinopharyngitis (52%), pharyngitis (18%), rhinitis (12%), tonsilopharyngitis (10%), tonsillitis (8%), and there were also complications and accompanying diseases found in some cases (Table 3).

The studies abroad reported the difference in the clinical manifestations of URI such as common cold occurred in 58.3%, rhinitis 16.4%, tonsilopharyngitis 7.5% and otitis media 7.1%;\(^{(16)}\) tonsilopharyngitis was found in 21.6%, and otitis media in 13.8%.\(^{(17)}\) Acute otitis media was the most common suppurative complications of URI, and the next were sinusitis, pneumonia, epiglottitis, peritonsilar abscess, periorbital cellulitis, and meningitis; while acute rheumatic fever and acute glomerulonephritis were another.
important complications belongs to non-suppurative type of post-streptococcal infection.(4)

The most cause of URI was virus (40%), and the others were streptococci (25%) a third to half of which were group A S. pyogenes, less common (1-2%) were C. diphtheriae, N. gonorrhoeae, Fusobacteria spp. and spirochaetes, and Chlamydia pneumoniae occupied 30% of patients with pharyngitis whenever the other cause was not found.(6) Nokso-Koivisto (2004) showed that the three most common viral causes of URI in children less than 2 years old was rhinoviruses, enteroviruses, and respiratory syncytial viruses.(5) Throat swab culture in our series showed positive in 93 cases (single bacteria in 57 and more than one in 36 cases), and negative in 7 cases. The bacteria were Staphylococcus aureus, Streptococcus β hemolyticus, Klebsiella pneumoniae, and Corynebacterium diphtheriae in 34%, 27%, 20%, and 1% of cases, respectively, while Staphylococcus albus and Streptococcus non-hemolytic were found in 32% and 17% of cases.

Among the so many species of staphylococcus, streptococcus, klebsiella, and corynebacterium most are normally found in the respiratory tract, but some others are pathogenic, such as S. aureus, S. epidermidis, and S. saprophyticus, S. pyogenes, S. dysgalactiae, and S. pneumoniae, K. pneumoniae, K. ozenae and K. rhinoscleromatis, and C. diphtheria.(20) The bacterial flora isolated from the culture of pharyngeal swab and middle ear were H. influenzae in 37-63%. S. pneumoniae in 40-58%, Non-typeable H. influenzae, and M. catarrhalis in 26-80%, group A streptococci in 17% of cases.(26)

S. aureus, S. pyogenes, K. pneumonia and C. diphtheria were tested for the sensitivity to 14 antibiotics, while such test was not done at S. albus and S. anhemolyticus, because the bacteria were considered as the saprophytes. The result of the sensitivity tests showed the evidence that the bacteria were of varying degree resistant to all antibiotics, except C. diphtheria which was still sensitive to amoxicillin-clavulanic acid, cefadroxyl, cefixime, and cotrimoxazol.

The study in Thailand reported that 37% of Streptococcus pneumoniae isolated from nasopharynx of children with URI were penicillin resistant while in Vietnam 39 to 87% of various pneumococcal strains were resistant to penicillin, cotrimoxazole, tetracycline, erythromycin, and cefotaxime,(28) and the report from Korea mentioned that within 7 years period, there were increasing resistance rate of group A streptococci to erythromycin and clindamycin from 29 to 51% and 10 to 34%, respectively.(26) A collaborative study between eight Latin American countries showed that S. pneumonia were penicillin-resistance in 30%, while to cefuroxime, cefachlor, and azithromycin, the bacteria were resistant in 9.2%, 20.8%, and 15.1% cases, respectively.(29)

Based on several studies it was concluded that the bacterial resistant related to the overused of antibiotics in the treatment of upper respiratory infections.(2,30-32) As much as sixteen to eighty nine percent of children with URI of whatever the causes who have visited family physician or pediatrician in various countries have received antibiotics for their treatment.(23,30,35-39) The reasons why did physicians over-prescribed antibiotics for respiratory tract infection (RTI), was of uncertainty diagnosis, socio-culture and economic pressures, prevention of secondary infection, shorten the duration of illness, lessen the illness severity, concerning over malpractice litigation, and parent expectations about antibiotics.(40) The quantitative systematic review of the treatment of URI concluded that the available evidence did not support antibiotic
treatment of children with URI because of lack of efficacy and the risk of complications or illness progression.\textsuperscript{(32,34,41)}

The way to reduce bacterial resistance is through reducing the number of inappropriate antibiotic prescriptions given to children with URI.\textsuperscript{(30,42,43)} Thence the effort has been taken through the intervention consisting of community dissemination of consumer information on antibiotic use for URIs and education of health professionals, resulted in statistically significant reductions in the range of 31-70\% of the dispensing of 6 antibiotics.\textsuperscript{(44)} In general, the recommended management for URI is symptomatic treatment that should be directed to maximize the relief of most prominent symptom(s), reduce the incidence of sequel such as deafness after otitis media, and minimize the inappropriate use of antibiotics in order to inhibit the development of antibiotic resistance and to conserve the resources.\textsuperscript{(2)} Bed rest, and voice rest is necessary, and increased fluid intake are recommended for all URI.

Nasal decongestant, NSAID, anti-tussives and expectorants free of codeine, can be administered to relieve the burden of URI.\textsuperscript{(2,3)} It is suggested that antibiotic treatment should be indicated for only a minority of patients with acute upper respiratory infections, included: (i) acute otitis media, (ii) mastoiditis, (iii) streptococcal pharyngitis, (iv) suppurative cervical lymphadenitis, (v) peritonsilar abscess, (vi) retropharyngeal abscess, and (vii) bacterial sinusitis.\textsuperscript{(2,45)} Particularly in the treatment of URI caused by group A beta hemolytic streptococci in approximately one third of cases,\textsuperscript{(34)} McIsaac (1998) recommended the application of the sore throat score in rationalizing the use of antibiotics in treating the URIs. To determine the score, the physician should assigns one score for each presence of the following 5 criteria: (i) history or measured temperature of $\geq 38^\circ$ C, (ii) absence of cough, (iii) tender anterior cervical adenopathy, (iv) tonsillar swelling or exudates, and (v) age less than 15 years. The patients with a score of $\geq 4$ the have highest likelihood of getting infection, then initiation of antibiotics administration or throat swab should be taken. If the score is 2 or 3, throat swab is taken and antibiotic is given due to positive culture, and if the score is $\leq 1$, antibiotic and throat swab are not recommended. The sensitivity and specificity of the score in identifying group A streptococcus infection in children at academic center were 96.9\% and 67.2\%,\textsuperscript{(46)} which significantly not different with the children of community based setting, i.e. 92.6\% and 72.6\%.\textsuperscript{(42)}

Regarding the 5 S score of McIsaac, Navaz et al (2000) stated that the probability of group A beta hemolytic streptococcal pharyngitis was related to node size and tenderness, tonsillar exudates and hypertrophy, and pharyngeal erythema and together these four predictors had a sensitivity of 71\%, a specificity of 77\%, and a positive predictive value of 46\%, thence culture is still essential for the confirmation of the streptococci.\textsuperscript{(31)}

**CONCLUSION**

The manifestations of URI were rhinopharyngitis (52\%), pharyngitis (18\%), rhinitis (12\%), tonsilopharyngitis (10\%), and tonsillitis (8\%), each of which could be associated with the complication and accompanying disease. The pathogenic bacterial spectrum of the throat consisted of \textit{S. aureus}, \textit{S. \textae flatus}, \textit{K. pneumonia}, and \textit{C. diphtheriae}. The bacteria were significantly different in distribution according to gender, age, and nutrition. These four pathogenic bacteria showed intermediate and resistant to 14 antibiotics tested, except \textit{C. diphtheriae} which was still sensitive to amoxycillin-clavulanate, cefadroxil, cefixime, and cotrimoxazol.
ACKNOWLEDGMENTS

The authors would like to extend the appreciation and thank Rector of Trisakti University and Dean of Medical Faculty for the support and providing the fund for this study. To the Head of Kalideres Community Health Center we also addressed our gratitude for the permission to study and the use of facilities in health center. At last, we also highly appreciated the participation of the mothers and their children in the study.

References


