

Upper respiratory tract infections in children: A normal stage or high parental concern?

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ABSTRACT

Background: Families function less efficiently when one of the children suffers from illness. Upper respiratory tract infections (URTI) are common among children. Though the child may have no critical or serious health problem, the parents may frequently get worried and visit the general practitioner or pediatrician. Do children with URTI who visit the doctor frequently pass through a normal stage in childhood or are their parents more concerned than usual? **Methods:** A questionnaire was filled out for 76 children between 1 and 4 years of age. Two groups were created: a URTI group and a control group. **Results:** The URTI group suffered from these infections for 19.4 days a month, compared with 5.9 days in the control group. In addition, they also suffered from fever for a longer duration and used more antibiotics. The parents of these children were found to be more concerned, caused by a fear of a serious disease. They often keep their child at home and make their child consume more medicines. **Conclusions:** Parents of children with recurrent infections are found to be more concerned and a hypothesis of high parental concern and child's illness is discussed. Minimizing parental concern can therefore be a possible preventive treatment.

Keywords: Recurrent Infections; Children; Concern; Family Functioning

1. INTRODUCTION

Children with recurrent illnesses are of great concern for parents and influence their family interactions. When children are ill, daily routines are changed and the parent usually adjusts to the need of the child. When the child suffers from recurrent infections, daily routines and family functioning can be disturbed for long periods of time. What can be done when there is no cure for these recurrent infections?

General pediatricians often come across parents who mention that their child has upper respiratory tract infections. The children may have no critical or serious health problem, but may not be doing well. During the in-between days they may be relatively normal but the subsequent infectious episode may already be emerging. Sometimes, the parents are reassured that everything is fine or some laboratory examinations are conducted to exclude immunologic disorders. Further evaluation is may be carried out by the pediatrician. Most of the time the condition can be addressed as being a normal stage in childhood [1]. Occasionally, older siblings may contaminate the younger children or they could be infected from daycare centers [2-4]. However, when the infections persist and no abnormalities are detected, it is very difficult for the pediatrician to treat the child.

In this study, we examined this group of children with upper respiratory tract infections without a somatic or immunologic disorder, who are frequent visitors to the doctor. We observed that the incidence of parents visiting the doctor with children suffering from upper respiratory tract infections has been growing in the last years. We conducted this study to elucidate this phenomenon. Can the infections be addressed as being a normal stage in childhood or does it exceed the normal incidence? Looking at the functioning of families; is there a relation between infections and high parental concern or should it be addressed as coincidence?

2. METHODS

2.1. Study Population

Children aged 1 - 4 years who visited the pediatric outpatient clinic because of recurrent upper respiratory tract infections were selected as the upper respiratory tract infections (URTI) group. These children were frequent visitors to the doctor according to their general practitioner. They were referred to the pediatrician by their general practitioner for further evaluation of their infections. They were not randomly selected and all parents were asked to fill out the questionnaire.

The control group had no medical history and was recruited at the outpatient clinic of the ophthalmologist. When children in the control group had a case of physical problems or illness, they were excluded from the control group. Both groups were recruited in a 3 month period between December 2007 and February 2008 at the Ziekenhuis Groep Twente a general hospital in Hengelo, The Netherlands.

All patients were measured for weight, height, and body mass index. To calculate the standard deviation of growth from each patient for comparison with the normal Dutch population, Growth Analyzer (version 3.5, Dutch Growth Stichting, The Netherlands) was used. Patients who visited the outpatient clinic for recurrent upper respiratory tract infections were blood tested for immunologic disorders according to our protocol [5].

2.2. Questionnaire

The questionnaire was newly developed and was comprised of the following questions: 1) How many days a month did your child suffer from upper respiratory tract infections (take the mean of the entire year)? 2) How many days a month is your child ill from an infection (take the mean over the entire year) and do you think your child is tired when compared with toddlers of the same age group? 3) How many antibiotic treatments a year is your child receiving from a doctor? 4) Is your child going to school, a daycare center, or does your child stay s at home? 5) Can you explain your family structure (two parents, divorced parents, single-parent family, or foster parents)? 6) How many children are there in your family? 7) Do you give your child over-the-counter medication or vitamins? 8) Are you worried when your child is not feeling well? 9) If you are worried, who can reduce your worries (choose from nobody, husband/wife, family, general practitioner, pediatrician, Internet)? 10) If your child is not feeling well, what do you do (choose from keep my child inside the house, keep my child in bed, buy medication, go the general practitioner, dress my child warm, do nothing)?

All the patients received an oral and written explanation about the goal of the study. All the patients gave their informed consent prior to their inclusion in the study. The ethical committee gave exemption to the reviewing of the questionnaire, because they considered that a questionnaire need not be reviewed.

2.3. Statistical Analysis

Statistical analysis was carried out using SPSS 11.5 for Windows (SPSS Inc, United States of America), and Student's *t*-tests, Mann—Whitney U analysis, and regression analysis were used.

3. RESULTS

3.1. Participants

In the URTI group, all parents participated in the study and 42 questionnaires were filled out. Five patients were excluded because of an incomplete questionnaire (1 patient), chromosomal abnormality with eating disorder (2 patients), and a combination of two children in one questionnaire (2 patients). In the control group, 45 parents filled out the questionnaire. Six children were excluded because of a systemic disease (3 children suffered from eczema, 2 from constipation, and 1 from recurrent urinary tract infections).

The group characteristics are described in **Table 1**. Gender, weight, and height were comparable in the three groups as was the family structure. Children in the URTI group were younger when compared with the control group. They were usually the eldest instead of the youngest in their family. In the following results there was a correction for age.

3.2. Incidence of Infections

The characteristics of the upper respiratory tract infections are described in **Table 1**. The URTI group suffered more from upper respiratory tract infections (19 days a month) when compared with the control group (6 days). Furthermore, these children suffered from (unexplained) fever for 7.4 days a month, thus significantly more than the control group. As a result, these children took more antibiotics. All the children in the URTI group had no immunologic abnormalities in their blood results which could explain the recurrent infections.

Table 1. Clinical characteristics of children with upper respiratory tract infection (URTI), and control group.

	URTI group N = 37	Control group N = 39
Sex (M/F), n	18/19	18/21
Age (months)	30 (14)	40 (1)**
Family with two parents, n (%)	37 (100)	38 (97.3)
Divorced parents, n (%)	0	1 (2.7)
Foster parents, n (%)	0	0
Children in family	1.8 (0.6)	2.2 (0.7)*
Day care (days a week)	2.1	2.3
Allergic constitution (%)	22.2	10.2
URTIs (days a month)	19.4 (11)	5.9 (9)**
Fever (days a month)	7.8 (9)	1.4 (5)**
Antibiotic use (courses a year)	2.1 (1.7)	0.2 (0.4)**
Vitamins/over the counter, n	27 (73%)	23 (59%)
Hospitalisation	10 (27%)	4 (10.3%)
Parents fear serious disease	18 (66.7%)	7 (30.4%)*

* p < 0.05, ** p < 0.01. Data are mean (SD) except when otherwise indicated.

3.3 Parental Concern

Parents of the children in the URTI group were more afraid of a serious disease (66.7%) compared with the control group (30.4%; $p < 0.05$). With experience, the fear disappeared. We observed that when parents had another child in the family (in both groups), the child had a chance reduction of 0.4 that his/her parents were afraid when the child was not feeling well. The children in the URTI group had a 4.6 times greater chance than those in the control group as having a parent who fears a serious disease when the child is not feeling well. When the parents of the children in the URTI group were worried, they more often had an urge to visit the pediatric clinic than those in the control group (**Table 2**). The parents of the children in the URTI group were less easily soothed by family or their partners when compared with those of the children in the control group, though this data was not significant. According to the parents, 24% of the children in the URTI group were more tired when compared with children of the same age group. The control-group children were not (0%).

Table 2 also shows the actions that parents take when their child is not feeling well. Parents of the URTI-group children tend to keep their child at home more rather than sending them to school, a daycare center, or a babysitter when compared with those of the children in the control group. When the significant items were combined, a child with an upper respiratory tract infection

Table 2. Percentage of parents who are worried, who reduces their worries, and their actions when their child is not feeling well.

	URTI group N = 37	Control group N = 39
Parents are worried	36 (97.3%)	22 (56.5%)**
<i>Who takes worries away?</i>		
Nobody	3 (8.3%)	0 (0%)
Spouse	23 (63.9%)	28 (75.7%)
Family	13 (36.1%)	18 (48.6%)
GP	20 (55.6%)	22 (59.5%)
Pediatrician	22 (61.1%)	0 (0%)**
Internet	1 (2.8%)	1 (2.7%)
Keep child in house	29 (80.6%)	18 (47.4%)**
Keep child in bed	22 (62.9%)	30 (76.9%)*
Buy medication	17 (47.3%)	7 (18%)*
Go to GP	9 (25%)	1 (2.6%)**
Dress child warm	4 (11%)	5 (12.8%)
Nothing	7 (20%)	15 (38.5%)

* $p < 0.05$, ** $p < 0.01$.

who stays at home, lies more often in bed, and gets more over-the-counter medication, is considered as needing treatment. The parents become worried and visit the general practitioner who in turn could not detect anything but decides to prescribe antibiotics (**Table 1**).

4. DISCUSSION

The normal variation of upper respiratory tract infections (including common cold) in toddlers consists of 6 - 8 periods a year [6,7]. When a mean is taken of 7 - 10 days for every infectious period, up to 6 days a month seems a reasonable period to have an infection [8-10]. According to the data, this number could be observed in the control group. A more recent study in Germany showed a lower frequency of common colds [11]. This study with diaries revealed a mean duration of a common cold episode between 9 and 15 days in children aged 0 - 4 years. These children had a mean cumulative time of common cold of about 4 weeks a year concentrated in the winter period. The URTI group in our study exceeded this number with a mean of 19 days a month. The days when a child had an unexplained fever were also increased when compared with the control group. The study of Gruber also described children with recurrent common cold episodes (>8 episodes a year), their cumulative time of common cold episodes exceeds the 4 weeks. The cumulative time of common cold in this specific group is not mentioned in their study. In the literature, the incidence of parents visiting the pediatrician with innocent recurrent infections is frequent [12], although the exact numbers are lacking.

What possible factors can contribute to the mechanism of upper respiratory tract infections? The group of toddlers suffering from upper respiratory tract infections was younger compared with the control group. The data was therefore statistically corrected for this age factor. Daycare attendance was observed to be a possible risk factor, along with factors such as having school-aged siblings and suffering from allergies [11,13,14]. In our study population, daycare attendance among children with upper respiratory tract infections was found to be lesser. In addition to this, there were a less number of children in the family and no significant increase in allergic disease. The children in both groups had similar growth parameters and social home environments. Do the parents perceive to have a problem and seek medical attention or is there really a problem with the children? We did observe that the incidence of upper respiratory tract infections is increased in the URTI group and exceeds the normal variation. The parents therefore do have a reason to visit the general practitioner. When we investigated parental fears, parents of the children in the URTI group were found to have a fear of serious disease. The worries and concern of the parents of the children in

the URTI group was expressed by adopting more concerning behavior, such as buying more vitamins and over-the-counter medication for everyday use. When their child was not feeling well, they tended to keep their child more in the house or in bed. They bought more medication and visited the general practitioner more often. Adopting a patient attitude was more difficult for them. When they were worried, they hoped that the pediatrician could take their worries away. This is a bit surprising because most of these children with upper respiratory tract infections visited the pediatric outpatient clinic for the first time. Our results of parental concern are almost similar to those obtained by Spurrier *et al.* [15]. They investigated the relation between asthma management by parents and the perception of parents regarding their children's vulnerability to illness. Parents who perceived that their children were more vulnerable to medical illness were more likely to keep their children home from school, visit the general practitioner for acute asthma care, and give their children regular preventive medication [15]. In contrast, the use of hospital services by parents was more associated with asthmatic symptoms than the parents' perception of vulnerability. In our study, we found that the parents wished to visit a pediatrician, but did not actually visit the hospital for the complaint until the general practitioner asked them to.

Could upper respiratory tract infections be the result of high parental concern? This is a question that is hypothetical and not easy to answer. There are numerous known and probably unknown variables involved in the pathogenesis of recurrent upper respiratory tract infections. In the recent literature, some associations between parenting and the development of disease in children could be found.

Sepa *et al.* proposed a mechanism of psychoneuroimmunology. High parental stress and lack of social support could influence the immune system by altering the hormonal and nervous signals [16-18]. They related a number of disparate variables of social, environmental, and medical character to the presence of high parenting stress and a lack of social support for the mothers. They stated that with this correlation, previously found risk factors for the disease could be mediated by psychological mechanisms. Boyce *et al.* showed that children with high environmental stress had altered immune reactivity, and therefore elevated rates of respiratory disease [19]. They showed two types of children: children with high or low immune reactivity to the stress of starting school. Combined with family circumstances, children with high immune reactivity and whose parents reported large numbers of stressful life events had the highest rates of respiratory disease. In contrast, children with low immune reactivity showed low numbers of illness in both high- and low-stress families. This was

similar to the high immune reactivity children coming from low-stress families. Andre *et al.* found that children from families with high parental concern suffered from more respiratory tract infections in a month when compared with those from families with medium or low concern [20]. These families also believed that their children were ill, though their children did not suffer from fever. These studies support our findings and suggest a correlation between respiratory disease and high parental stress, although direct evidence is lacking. These findings could also mean a possible target for prevention. Could a therapy of reducing parental anxiety bring down the visits to the doctor? Or could the actual rate of infections be influenced? These questions should be investigated clinically before definite conclusions can be made.

A possible limitation s of our study could be the time period used, as toddlers typically suffer from a common cold more frequently in winter season [11]. The effect of the cold season could contribute to the disease, although similar numbers were also found in studies conducted in the summer (manuscript in preparation). The parents and the children could also be referred because the parents are more concerned. This can introduce a selection bias into our study. We think this is a reasonable assumption but choose to accept this selection bias. This population of parents is especially difficult for doctors to deal with. The parents are usually very persistent and the symptoms of their children are usually difficult to interpret. We tried to objectify and separate parental fears from health parameters but found they cannot be separated completely.

Secondly, our study sample was relatively small and the children in the URTI group were younger when compared with those in the control group. The incidence of the infections could be explained by the younger age of our URTI group. Other studies showed a mean incidence of 2.7 episodes of common cold in children aged 30 months compared to 2.2 episodes in children aged 40 months [11]. Based on these numbers, one would expect less episodes of common cold in the control group. We did find less episodes, but the difference between the control children and the children with URTI was bigger than could be explained by the age factor alone. Hence, we performed a statistical correction for the age factor to minimize this variable. The influence of the age factor should be investigated in future studies.

In this study we worked with parental recalls, but they are less reliable compared to collection of data on a day-to-day base. Both groups used the same recall method, but with concerned parents, one can expect higher recall numbers of sickness days compared with the control group.

5. CONCLUSION

According to the data obtained, it can be observed that both the assumptions were confirmed. Children with upper respiratory tract infections who visit the doctor frequently, were found to exceed the normal variation of incidence of respiratory disease according to their parental recalls. This being a normal stage in childhood is therefore unlikely. This incidence was found to be high and resulted in an emerging phenomenon. High parental concern was however also observed. A relation between high parental concern and children's respiratory illnesses could be possible but further data is needed to elucidate the exact mechanism.

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