# Characteristics of Children with Acute Rheumatic Fever in Two Governorates of Upper Egypt

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## Abstract:

While the incidence and prevalence of acute  rheumatic fever (ARF) and rheumatic heart disease (RHD) have been decreasing in developed nations since the early 1900s, they continue to be major causes of morbidity and mortality among children in developing nations. **Aim of the study:** The aim of the present study is to evaluate the characteristics of children with **ARF** in two governorates  in upper Egypt. **Materials and Methods:** The study was conducted in pediatric cardiology clinics in pediatric departments of Assiut and Sohag University hospitals. The study included **160** children aged 5-15 years old with ARF, **eighty** from each pediatric department of Assuit and Sohag University **H**ospitals. A control group of apparently healthy children of **same** number for each group was included. Three tools for collecting data **were** used in this study: tool one is an assessment questionnaire of children and parents knowledge about **rheumatic fever** (RF).  Tool two: Assessment of socioeconomic condition of families. Tool three included anthropometric measurements of children. **Results:**  ARF was more common among male children (62.5%) than females (37.5%) in Assiut compared with Sohag group (41.3%, 58.7% respectively) **(P=0.002)**. Children with RF were more prevalent among families living in rural areas in Assiut and Sohag (78.8% and 60% respectively) than urban (21.25% and 40% respectively) **(P=0.008)**.  High percentages of illiteracy of the fathers of children with RF in Assiut (58.8%) and Sohag (62.5%) and similarly were the mothers in Assiut and Sohag (87.5% and 77.5% respectively). There was a significant difference between low socio-economic class (200-400 **L.E**) of families in Assiut and Sohag and RF **(P=0.009)**.. The Majority of fathers of **the** two study groups in Assiut and Sohag were workers and farmers (85.0% and 71.25% respectively). Also the majority of mothers in both groups were housewives (95.0% and 82.5% respectively). About one quarter in Sohag group (23.75%) had a family history of RF compared to 21.25% in Assiut. There was a lack of parents' knowledge about RF including definition, causes, signs and symptoms, treatment, persons at risk **of** RF, its complications and caring of child with RF.
**Conclusion:** RF occurs equally in both sexes to some extent, more common among rural, crowded, low socioeconomic families with high percentage of illiteracy, unemployment, and lack of knowledge about RF among parents.

## Introduction:

Rheumatic fever (RF) is an inflammatory autoimmune disease that follows untreated streptococcal throat or skin infections. It is one of the diseases responsible for acquired heart disease **(Potts and Mandleco, 2007).**
RF is common worldwide and responsible for many cases of damaged heart valves in children **(Lissamer, 2007)**. Porth (2007) reported that**,** although any one can develop RF, the resulting rheumatic heart disease (RF) (RHD) can be life long and occurs approximately 20 days after streptococcal throat infection or scarlet fever.
Olivier (2004) reported that, the incidence of RF in Egypt was 10/100.000**.** Worldwide, 5-30 million children and young adults have chronic rheumatic heart disease (RHD) and 90,000 patients die from this disease each year.  RF is seasonal in occurrence with most new cases seen in late winter and spring (Gerber, 2004).

Disease prevalence in the United States is a function of socioeconomic status, with higher frequency in areas of crowding. The United States had experienced a resurgence of RF in the last 2 decades, with many of the reported cases involving persons in upper socioeconomic groups **(Olgunturk et al, 2004).**
The incidence of recurrence with a subsequent untreated infection is substantially greater than 50% (WHO, 2009)**.** Its peak is among children between ages 5 and 15 years old (American heart Association, 2008).
The nurse plays an important role with the child with RF such as encourage adequate rest and nutrition **(David, 2008)**. Encouraging compliance with drug regimens by administration of antibiotics therapy for at least 5 years after initial attack or until they are 18 years of age **(Pillitteri, 2007).** Facilitating recovery from the illness, providing emotional support and preventing recurrence of disease **(Hockenberry, 2007)**. As well as teaching patients and their families about the disease, its treatment, preventive steps

needed to avoid potential complications such as the need for prophylactic antibiotic before invasive procedures **(Smeltzer, 2004).**

Although the bacteria are the causative agents; malnutrition, overcrowding and lower socioeconomic status may predispose children to RF (**Chin and Worley, 2003 and Guzman et al, 2004).).** A greater risk of rheumatic fever is associated with overcrowding and poor sanitation (**Mayo clinic, 2009).**

**Aim of the study:** The aim of the present study is to evaluate the characteristics of children with rheumatic fever in two governorates in upper Egypt.

## Material and Methods:

The study was conducted in pediatric cardiology clinics in pediatric departments of Assiut and Sohag Universities. The study included 80 children aged 5-15 years old with RF in department of pediatrics of Assiut University and a similar number from department of pediatrics of Sohag University hospital. A control group of apparently healthy children of the same number of the children for each group was included.

There are 3 tools for collecting data used in this study:

**Tool 1:** an assessment questionnaire for children and parents knowledge about RF which included: sociodemographic characteristics, family history, medical history of the child and parent's knowledge about RF.

**Tool** 2: assessment of socioeconomic condition of families by using Abd El-Tawab scale 2004 which included questions about: 1- the educational status of the family; 2- the occupational status of the family; 3- the family life style, 4- The finances of family.

**Tool 3:** included anthropometric measurements involving weight, height, mid arm, chest and head circumference.

The tools were tested for content related validity by 5 experts in the pediatric field. A pilot study was conducted on 8 patients in order to test the clarity and applicability of the tools and necessary modifications were done.

## The study methods:

1- **An official** permission was obtained from the head of departments of pediatrics of Assiut and Sohag university hospitals to collect the necessary data for the study.

2-**A moral** permission was obtained from the children and parents to collect data. 3- An interview was done by the researcher with the one or both parents to explain the purpose of the study and ask them for participation. Each interview took about 15-

20 minutes. Throughout the interview relative information was recorded in the designed sheet depending upon the response of the participant. After that anthropometric measurements for the child were done. 4- The duration of the study was six months from the 15th of November /2009 until the 15th of May /2010.

## Results:

**Table (1):** showed that statistical significant differences were found between both groups as regard age, sex, residence and number of children in family. The RF was common among male children in Assiut while among female children in Sohag. The rural residence was more common among Assiut children than among Sohag children.

**Table (2)** showed that, statistical significant differences were found as regard father education, family income and father's job while no statistical significant differences were found regarding mother's education and mother's job. The majority of children with RF showed similar characteristics with few differences; higher prevalence of illiteracy of both parents, low income less than 400 PE/month, Most of fathers are workers and farmers and most of mothers are house wife.

**Table (3):** showed that, statistical significant difference was found regarding type of house. Although not statistical significant difference was found regarding number of persons per room but both groups showed similar percentages of 3 persons or more/room.

**Table (4):** showed that, statistical significant difference was found as regard number of tonsillitis attacks while no statistical significant differences were found regarding family history of R.F, family member with R.F, history of recurrent tonsillitis and method of treatment. Both groups had similar percentage of family history of RF and recurrent attacks of tonsillitis.

**Table (5):** showed that, statistical significant differences were found between both groups regarding way of handling of secretions, special tools for eat and drink and covering mouth during cough while no statistical significant difference was found regarding the use of tooth brush. Both groups with few differences had similar criteria; the majority of children with RF have no special tools for eating and drinking, no care about handling of secretion, no special tooth brush and are not covering mouth during cough.

**Table (6):** Represents behavior of asking medical treatment and duration of rheumatic fever in both study groups in Assuit and Sohag. Statistical significant differences were found between the two

study groups as regard treatment of fever and duration of RF (years). Regarding treatment of RF it was observed that, higher percentages in Sohag group (51.25%) go to doctor for treatment of fever than in Assiut group (31.25%). Regarding duration of RF it was found that; more than the half of children in Assiut and Sohag groups had duration of < 1 year. No statistical significant differences were found between the two groups regarding dealing of children in hospital during R.F and hospitals types.

**Table (7):** Shows the parent's knowledge about rheumatic fever in both study groups in Sohag and Assuit. Regarding definition of RF; it was observed that the majority of parents in both groups (85.0%,

80.0%) respectively do not have knowledge about RF. Regarding the causes of RF it was found that; the majority of parents in both groups do not know the causes of RF in Assiut and Sohag group (95.0%,85.0%) respectively. Regarding complications of RF it was found that, a higher percentage of parents in Assiut group know that, RF has complications (97.5%) than among Sohag group (75.5%). Regarding type of complications of RF it was noted that; more than three quarters of parents (75.65%) in Assiut group know that mitral valve affection is a complication of RF compared to 35.0 % in Sohag group.

**Table (1): Sociodemographic characteristics of the study children of both groups in Assuit and Sohag**

| Items | Assiut group (No=80) | | Sohag group(No=80) | | P-value |
|---|---|---|---|---|---|
| | No | % | No | % | |
| **Age (years)** | | | | | |
| • 5-8 | 20 | 25.0 | 20 | 25.0 | |
| • 9-11 | 42 | 52.5 | 30 | 37.5 | 0.000*** |
| • 11-15 | 18 | 22.5 | 30 | 37.5 | |
| **Mean± SD** | 11.66±2.48 | | 9.57±3.56 | | |
| **Sex:** | | | | | |
| • Male | 50 | 62.5 | 33 | 41.3 | 0.002* |
| • Female | 30 | 37.5 | 47 | 58.7 | |
| **Residence:** | | | | | |
| • Rural | 63 | 78.8 | 48 | 60.0 | 0.008** |
| • Urban | 17 | 21.2 | 32 | 40.0 | |
| **Number of children in family** | | | | | |
| • 1-3 | 4 | 5.0 | 12 | 15.0 | |
| • 4-6 | 65 | 81.25 | 60 | 75.0 | 0.001** |
| • More than 6 | 11 | 13.75 | 8 | 10.0 | |
| **Mean± SD** | 4.83±1.69 | | 4.73±1.72 | | |

*N.S.: Not significant P >0.05       * P< 0.05          ** P< 0.001              *** P< 0.000*

**Table (2): Distribution of children according to parents education, family income and work in family of both groups**

| Items | Assiut group(No=80) | | Sohag group(No=80) | | P-value |
|---|---|---|---|---|---|
| | No | % | No | % | |
| **Father education:** | | | | | |
| ☐ Illiterate | 47 | 58.75 | 50 | 62.5 | |
| ☐ Read and write | 4 | 5.0 | 6 | 7.5 | |
| ☐ Primary education | 13 | 16.25 | 4 | 5.0 | 0.03* |
| ☐ Preparatory education | 8 | 10.0 | 4 | 5.0 | |
| ☐ Secondary education | 6 | 7.5 | 8 | 10.0 | |
| ☐ University education | 2 | 2.5 | 8 | 10.0 | |
| **Mother education:** | | | | | |
| ☐ Illiterate | 70.0 | 87.5 | 62 | 77.5 | |
| ☐ Read and write | 0 | 0.0 | 2 | 2.5 | |
| ☐ Primary education | 0 | 0.0 | 4 | 5.0 | 0.142 |
| ☐ Preparatory education | 0 | 0.0 | 0 | 0.0 | |
| ☐ Secondary education | 4 | 5.0 | 6 | 7.5 | |
| ☐ University education | 6 | 7.5 | 6 | 7.5 | |

| Items | Assiut group(No=80) | | Sohag group(No=80) | | P-value |
|---|---|---|---|---|---|
| | No | % | No | % | |
| **Family income** | | | | | |
|    ☐  Less 100 L.E | 2 | 2.5 | 4 | 5.0 | |
|    ☐  100-200  L.E | 8 | 10.0 | 4 | 5.0 | |
|    ☐  200-400  L.E | 46 | 57.5 | 27 | 33.75 | 0.009** |
|    ☐  400-800  L.E | 22 | 27.5 | 37 | 46.25 | |
|    ☐  800-1500 L.E | 2 | 2.5 | 4 | 5.0 | |
|    ☐  More than 1500 L.E | 0 | 0.0 | 4 | 5.0 | |
| **Father's job** | | | | | |
|    ☐  Worker and farmer | 68 | 85.0 | 57 | 71.25 | 0.024* |
|    ☐  Employer | 6 | 7.5 | 10 | 12.5 | |
|    ☐  Specialist | 2 | 2.5 | 4 | 5 | |
|    ☐  Died | 4 | 5.0 | 9 | 11.25 | |
| **Mother's job** | | | | | |
|    ☐  House wife | 76 | 95.0 | 66 | 82.5 | |
|    ☐  Employer | 2 | 2.5 | 8 | 10.0 | 0.07 |
|    ☐  Specialist | 2 | 2.5 | 4 | 5.0 | |
|    ☐  Hand work | 0 | 0.0 | 2 | 2.5 | |

*N.S.:Not significant P > 0.05        *P< 0.05  ** P< 0.001            L.E: Egyptian pound*

**Table (3): The percentage distribution of children according to type of house and number of persons per room in both study groups.**

| Items | Assuit group(No=80) | | Sohag group(No=80) | | P-value |
|---|---|---|---|---|---|
| | No | % | No | % | |
| **Type of house** | | | | | |
|    ☐  Not owner | 2 | 2.5 | 8 | 10.0 | |
|    ☐  Owner | 78 | 97.5 | 72 | 90.0 | 0.04* |
| **Number of persons per room** | | | | | |
|    ☐  3 persons or more | 77 | 96.2 | 76 | 95.0 | 0.50 |
|    ☐  2 persons | 3 | 3.8 | 4 | 5.0 | |
|    ☐  person | 0 | 0.0 | 0 | 0.0 | |

*N.S.:Not significant P > 0.05          * P< 0.05*

**Table (4): The percentage distribution of children according to family history of RF in both study groups**

| Items | Assuit group(No=80) | | Sohag group(No=80) | | P-value |
|---|---|---|---|---|---|
| | No | % | No | % | |
| **1-Family history of R.F** | | | | | |
|    ☐  Yes | 17 | 21.25 | 19 | 23.75 | 0.425 |
|    ☐  No | 63 | 78.75 | 61 | 76.25 | |
| **2- Family member with R.F** | | | | | |
|    ☐  Mother or father | 8 | 10.0 | 2 | 2.5 | |
|    ☐  Uncle | 6 | 7.5 | 10 | 12.5 | 0.454 |
|    ☐  Grand mother or grand father | 3 | 3.75 | 7 | 8.75 | |
| **3-History of recurrent tonsilitis:** | | | | | |
|    ☐  Yes | 76 | 95.0 | 76 | 95.0 | 0.640 |
|    ☐  No | 4 | 5.0 | 4 | 5.0 | |
| **4-Number of tonsillitis  attack/month** | | | | | |
|    ☐  One | 4 | 5.0 | 0 | 0.0 | |
|    ☐  Two | 5 | 6.25 | 15 | 18.75 | 0.013* |
|    ☐  Three or more | 2 | 2.5 | 8 | 10.0 | |
| **5-Method of treatment** | | | | | |
|    ☐  Go to doctor | 55 | 68.75 | 55 | 68.75 | |
|    ☐  Take a drug without doctor | 25 | 31.25 | 25 | 31.25 | 0.198 |

*\N.S.:  Not significan P>0.05              * P< 0.05*

**Table (5): The distribution of children habits during personal hygiene in both study groups**

| Items | Assiut group(No=80) | | Sohag group(No=80) | | P-value |
|---|---|---|---|---|---|
| | No | % | No | % | |
| **1-Special tools for eat and drink** | | | | | |
| ☐  Yes | 4 | 5.0 | 2 | 2.5 | |
| ☐  No | 71 | 88.75 | 78 | 97.5 | 0.02* |
| ☐  Not care | 5 | 6.25 | 0 | 0.0 | |
| **2-Way of handling secretions:** | | | | | |
| ☐  In special dressing | 10 | 12.5 | 24 | 30.0 | 0.000*** |
| ☐  No  care about | 70 | 87.5 | 56 | 70.0 | |
| **3-Have special tooth brush** | | | | | |
| ☐  Yes | 2 | 2.5 | 0 | 0.0 | 0.248 |
| ☐  No | 78 | 97.5 | 80 | 100 | |
| **4-Covering mouth during cough:** | | | | | |
| ☐  Yes | 30 | 37.5 | 45 | 56.25 | 0.013* |
| ☐  No | 50 | 62.5 | 35 | 43.75 | |

*N.S. :  Not significant P > 0.05        *P< 0.05   *** P< 0.000*

**Table (6): Behavior of asking medical treatment and duration of rheumatic fever in both study groups**

| Items | Assiut group (No=80) | | Sohag group(No=80) | | P-value |
|---|---|---|---|---|---|
| | No | % | No | % | |
| **Treatment of fever** | | | | | |
| ☐   Go to doctor | 25 | 31.25 | 41 | 51.25 | |
| ☐   Take medications without visiting doctor | 55 | 68.75 | 39 | 48.75 | 0.000*** |
| **Child in hospital during R.F** | | | | | |
| ☐   Isolated | 0 | 0.0 | 0 | 0.0 | 0.298 |
| ☐   With other patients | 34 | 42.5 | 31 | 38.75 | |
| **Hospitals type** | | | | | |
| ☐   Private department | 30 | 37.5 | 24 | 30.0 | 0.237 |
| ☐   Governorate | 4 | 5.0 | 7 | 8.75 | |
| **Duration of R.F (years)** | | | | | |
| ☐< 1 | 59 | 73.75 | 49 | 61.25 | |
| ☐2-3 | 11 | 13.75 | 29 | 36.25 | 0.000*** |
| ☐>3 | 10 | 12.5 | 2 | 2.5 | |

*N.S.: Not significant P > 0.05          ***P< 0.000*

**Table (7): Parent's knowledge about rheumatic fever in both study groups**

| Items | Assiut group(No=80) | | Sohag group(No=80) | |
|---|---|---|---|---|
| | No | % | No | % |
| **1-Definition of R.F** | | | | |
| ☐   Know | 12 | 15.0 | 16 | 20.0 |
| ☐   Don't Know | 68 | 85.0 | 64 | 80.0 |
| **2-Causes of R.F** | | | | |
| ☐   Genetic | 4 | 5.0 | 4 | 5.0 |
| ☐   Medical | 0 | 0.0 | 0 | 0.0 |
| ☐   Others | 0 | 0.0 | 8 | 10.0 |
| ☐   Don't know | 76 | 95.0 | 68 | 85.0 |
| **4- Treatment of R.F** | | | | |
| ☐   Yes | 18 | 22.5 | 20 | 25 |
| ☐   No | 62 | 77.5 | 60 | 75 |

| Items | Assiut group(No=80) | | Sohag group(No=80) | |
|---|---|---|---|---|
| | No | % | No | % |
| **5- Persons at risk for R.F** | | | | |
| ☐ Yes | 4 | 5.0 | 0 | 0.0 |
| ☐ No | 76 | 95.0 | 80 | 100 |
| **6-follow up of child with R.F** | | | | |
| ☐ Yes | 80 | 100 | 80 | 100 |
| ☐ No | 0 | 0.0 | 0 | 0.0 |
| **7-Complications of RF** | | | | |
| ☐ Yes | 78 | 97.5 | 60 | 75.0 |
| ☐ No | 2 | 2.5 | 20 | 25 |
| **8-Type of complication of RF** | | | | |
| ☐ Mitral valve affection | 59 | 75.65 | 28 | 35.0 |
| ☐ Mitral and aortic affection | 11 | 14.10 | 31 | 38.75 |
| ☐ Pericardial effusion | | | | |
| | 8 | 10.25 | 1 | 1.25 |

## Discussion:

Although the incidence of acute RF and RHD has decreased significantly in regions of the world where antibiotics are easily accessible, there remains a high incidence in developing nations as well as in certain regions where there is a high incidence of genetic susceptibility. RF and RHD cannot be separated from an epidemiological point of view. These diseases are a function of poverty, low socioeconomic status, and barriers to healthcare access, and it is in the developing world that a comprehensive prevention program is most critically needed (**Christopher Chang, 2012**).

Several reports from the developing world have documented RF incidence rates as high as 206/100 000 and RHD prevalence rates as high as 18.6/1000. The high frequency of RHD in the developing world necessitates aggressive prevention and control measures. RF continues to cause significant morbidity in children (**James, 2007).**

**Margaret et al, (2007)** mentioned that RF has declined in developed countries due to the

effective use of antibiotics to treat streptococcal infections. Although **Carapetis (2005)** stated that, the incidence of RF in some developing countries is still high and exceeds 50 per 100000 children.

**NHI (2004)** stated that, the prevalence of the disease among school children in Egypt is 913,409. The prevalence in his study is consistent with a study from Egypt giving a rate of 3.4 per 1000 among school children in the El-Menoufia area. Earlier reports from Egypt in the 1960s gave different figures 1.3 per 1000 in the western desert coast and 0.7 per 1000 in Alexandria (**Steer et al, 2002**).

In the present study in Assiut group, RF was slightly common in males than females (62.5 % and 37.5%) respectively. The finding is consistent with the results

of **Rizvi et al (2004)** who stated that the sex ratio was 113 males to 100 females in children with rheumatic fever in his study. It also agrees with the study conducted by **Silva (2010)** who stated that 57% of children with RF were boys. Meanwhile, Sohag group males were less affected than females (41.3% and 58.7%)respectively.

This result is in agreement with the result of **Carapetis (2005)** who mentioned that RF is common in females than males. The present study also agrees with the results of a study conducted by **National Institute of Cardiovascular Diseases (2003)** that reported that females were significantly more likely to be affected with RF and RHD.

On the other hand, **Binotto (2002)** and **Dajani (2001)** reported that RF occurs in equal numbers in males and females. **James (2007)** stated that, there is no difference in incidence of RF found on the basis of sex.

Regarding residence the results of the current study showed that, children with RF is more prevalent among families living in rural areas in Assiut and Sohag (78.8% and 60%) respectively; this may be attributed to lack of awareness about caring of their children and protecting them from predisposing factors. These findings are consistent with a study conducted in Pakistan by **National Institute of Cardiovascular Diseases (2003)** that reported a high prevalence of RF and RHD among the rural population. Also **Faiz (2004)** found a high prevalence of RF among the rural population.

On the other hand, **Regmi et .al. (1997)** found that most of the children with RF were from the urban area (91.6%), while a minority come from a rural area (8.4%).

Regarding the number of children in family, the results of current study revealed that means ± SD was (4.83 ±1.69) in Assiut and (4.73 ±1.72) in Sohag.

These results are in agreement with the study conducted by **Laurence (2002)** who mentioned that the incidence is increased by poverty and overcrowding and decreased by improvement in living standards and reported a significant correlation between socioeconomic level and the prevalence of RF. Poverty and illiteracy breed over-crowding that promotes the spread of many infections, and due to ignorance and scarcity of healthcare facilities, these are often neglected until complications set in, as in the case of RF.

Regarding the father's and mother's education, the results of the present study revealed a high percentage illiteracy among fathers in Assiut and Sohag (58.8% and 62.5% respectively) and among mothers in Assiut and Sohag (87.5% and 77.5% respectively). On the other hand, 2.5% of the fathers in Assiut and 10% in Sohag obtained a university education and 7.5% of the mothers in Assiut and Sohag obtained a university education also.

The results of the present study are in agreement with the study conducted by **Meira et al. (2005)** who reported that a high percentage of mothers did not complete elementary school (86.0%) and were illiterate and found a significant correlation between low mother's educational level and a higher incidence of RF. This mean that, the low parental education level has a relation to the incidence of the disease and its complications, this is because educated parents have a higher ability to appreciate the problem and higher intension to control it. In addition, the educated parents are easily instructed to well cooperate to achieve the program of treatment and to care for their children.

**Lennon et al. (2009)** stated that, low levels of education, income, and social status have previously been noted as factors related to the incidence of RF. Also **korokoro (2009)** found a link between the low education of the mother and an adjusted relative risk of rheumatic fever. **Al-Naib (2008)** in Yemen showed that poverty, illiteracy, poor health education and lack of medical services are responsible for the increased incidence of RHD and its complications among Yemenis.

Regarding the family income, the findings of the present study showed that, RF is more prevalent in low socio- economic class (200-400 P.E). These results are in agreement with the study conducted by **Bison et al. (1997)** who found that, RF is closely associated with low socioeconomic families. **Carapetis et al (2009)** stated that RF is a disease of poverty. **Abdel-Moula et al (1998)** reported thirty four RF cases (with an estimated prevalence of 6.2/1000 students) had low socioeconomic status. The results of the present study disagree with **National Institute of Cardiovascular Diseases (2003)** which stated that there was no significant relation with other factors studied as education, crowding, and socioeconomic status.

Regarding fathers and mothers job the present study revealed that the majority of fathers of study groups in Assiut and Sohag were workers and farmers (85.0% and 71.25% respectively) and also the majority the mothers were housewives (95.0% and 82.5% respectively).

These results are in agreement with the study conducted by **korokoro (2009)** who found a significant association between the occurrence of rheumatic fever and having both parents unemployed. Regarding the number of persons per room, the present study showed that most of cases were three persons or more per room in Assiut and Sohag groups (96.2% and 95.0% respectively).

The results of the present study are in agreement with the study conducted by **Rizvi, et al (2004)** who stated that, crowding based on the number of household members and number of rooms in the house and single room with five or more people was closely related to the incidence of RF. **Bulletin of the World Health Organization (2001)** reported that most families of children with RF lived in overcrowded homes, with an average of 3.7 persons per room.

Regarding the family history, the results of the present study showed that about (23.75%) in Sohag group and 21.25% in Assiut group had a family history of RF in a parent, uncle, or grandparent. These results are in agreement with those of **Lee et al (2006)** who found that, family history is an important factor in acute RF. **Abdel-Moula, (2000)** reported that, positive family history of acute RF and RHD. And paternal consanguinity were significantly associated with the occurrence of RF and RHD. CDC (1987) reported that, 38 patients had a family history of RF in a parent, sibling, aunt, uncle or grandparent.

Regarding the parent's knowledge about RF the current study showed that, high percentage of the mothers of children with RF have little or no knowledge about the definition, causes, signs and symptoms, treatment, persons at risk for RF and its complications. These results are in agreement with the study conducted by **Kasmaei et al (2009)** who found that, fewer mothers had a good level of knowledge about symptoms, route of infection and complications.

## Conclusion:

RF is more common among male children in Assiut and females in Sohage. It is more common among rural, crowded, low socioeconomic families with high percentage of illiteracy, unemployment, and lack of

knowledge about RF among parents with positive family history of RF.

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