Epidemiology Of Rheumatic fever



Objectives

- Define rheumatic fever .
- Describe the epidemiological triad and determinants.
- Discuss trends in global and Iraqi prevalence.
- Recognize age, sex, and environmental risk factors.
- Explain prevention and control strategies.
- Appreciate the link between Group A Streptococcus and RF.

Confirmed case

By lab. confirmation with or without clinical evidence of invasive disease.

Isolation of group A streptococcus (Streptococcus pyogenes) from :

Blood, cerebrospinal fluid (CSF), pleural fluid, pericardial fluid, peritoneal fluid, deep tissue specimen taken during surgery .

Probable case

Clinical evidence of invasive disease in the absence of another identified etiology and with non-confirmatory laboratory evidence of infection:

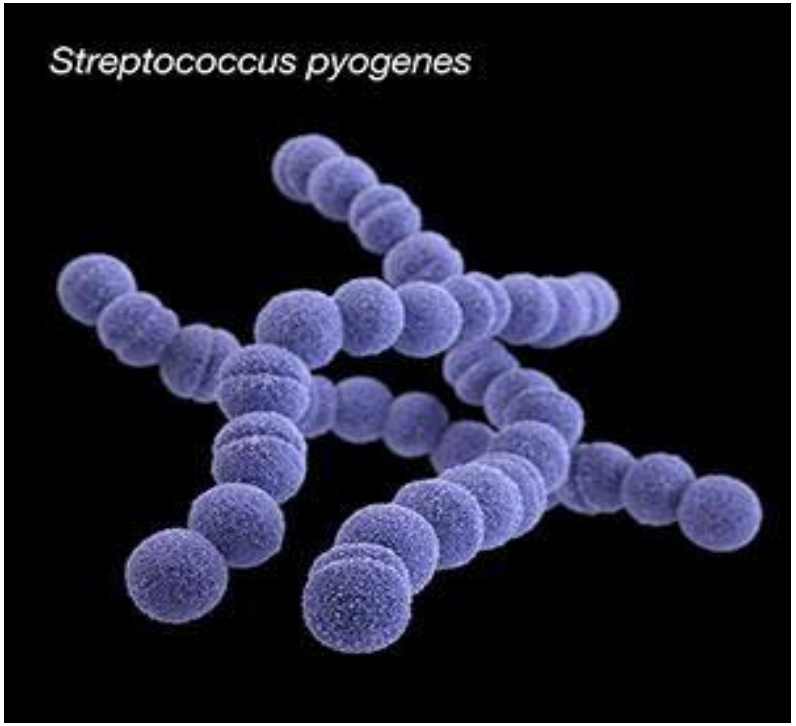
- **Isolation of group A streptococcus from a non-sterile site OR**
- **positive group A streptococcus antigen detection.**

Epidemiology and Occurrence

Causative Agent :

Group A streptococcus – Streptococcus pyogenes=GAS

Gram-positive coccus



- Reservoir: Humans.
- Incubation Period :1-3 days
- Period of Communicability The specified period of infectivity of the index case is:

7 days prior to the onset of illness, until 24 hours after the start of treatment.

Mode of Transmission

- **Large respiratory droplets.**
- **Direct contact with**

Risk Groups

1. **Chronic conditions (cancer, heart disease, diabetes, lung disease,HIV infection).**
2. **Alcohol abuse.**
3. **IV drug addiction.**
4. **Checkenpox.**
5. **Crowded living conditions and sub-optimal hygiene .**
6. **Immunosuppressive therapy and Systemic steroid**
7. **(65 years and older).**

Contact Definition

Definition of Close Contacts

- **Household contacts of a case who has spent at least 4 hours/day on average in the previous 7 days or 20 hours/week with the case.**
- **Non-household persons who share the same bed with the case .**
- **Persons who have had direct mucous membrane contact with the oral or nasal secretions.**
- **Injection drug users who have shared needles .**

Streptococcal Pharyngitis

About 10% of adults with sore throat are infected with GAS=Group A streptococci

Among children with sore throat, the prevalence of GAS can be as high as 35%,with rates peaking from

5 to 15 years of age

Evaluation: consist of four findings

(1) History of fever,

(2) Absence of cough

(3) Tender anterior cervical lymphadenopathy.

(4) Tonsillar exudate or swelling.

RAPID STREP TESTS



Rapid GAS-specific antigen tests have a sensitivity of ~80% and a specificity of ~95%.

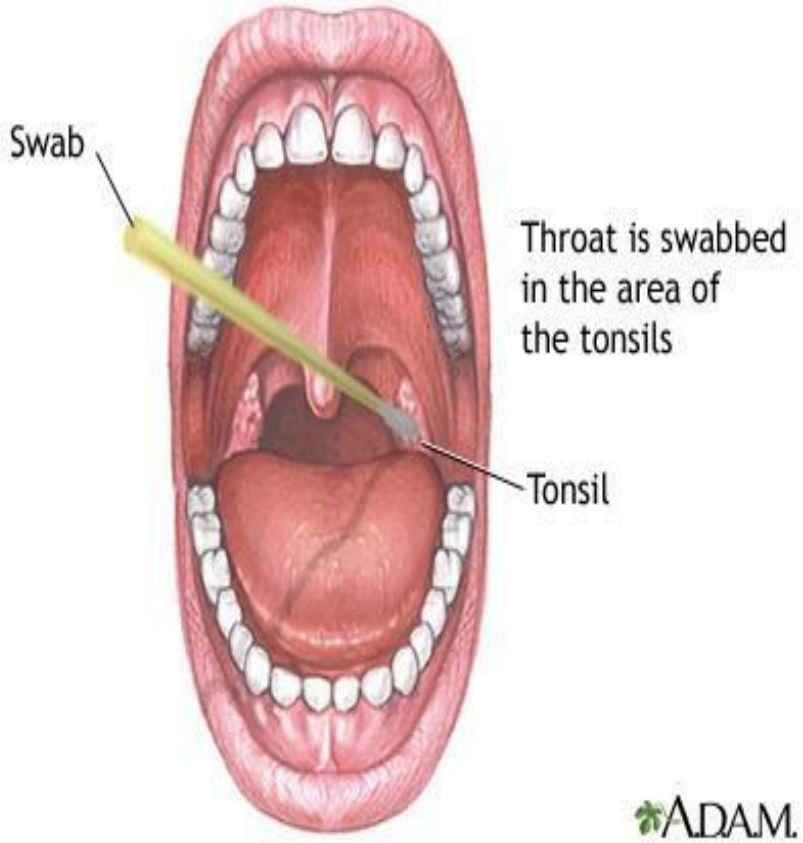
Results are available within minutes and can be used to make therapeutic decisions before the patient leaves the office.



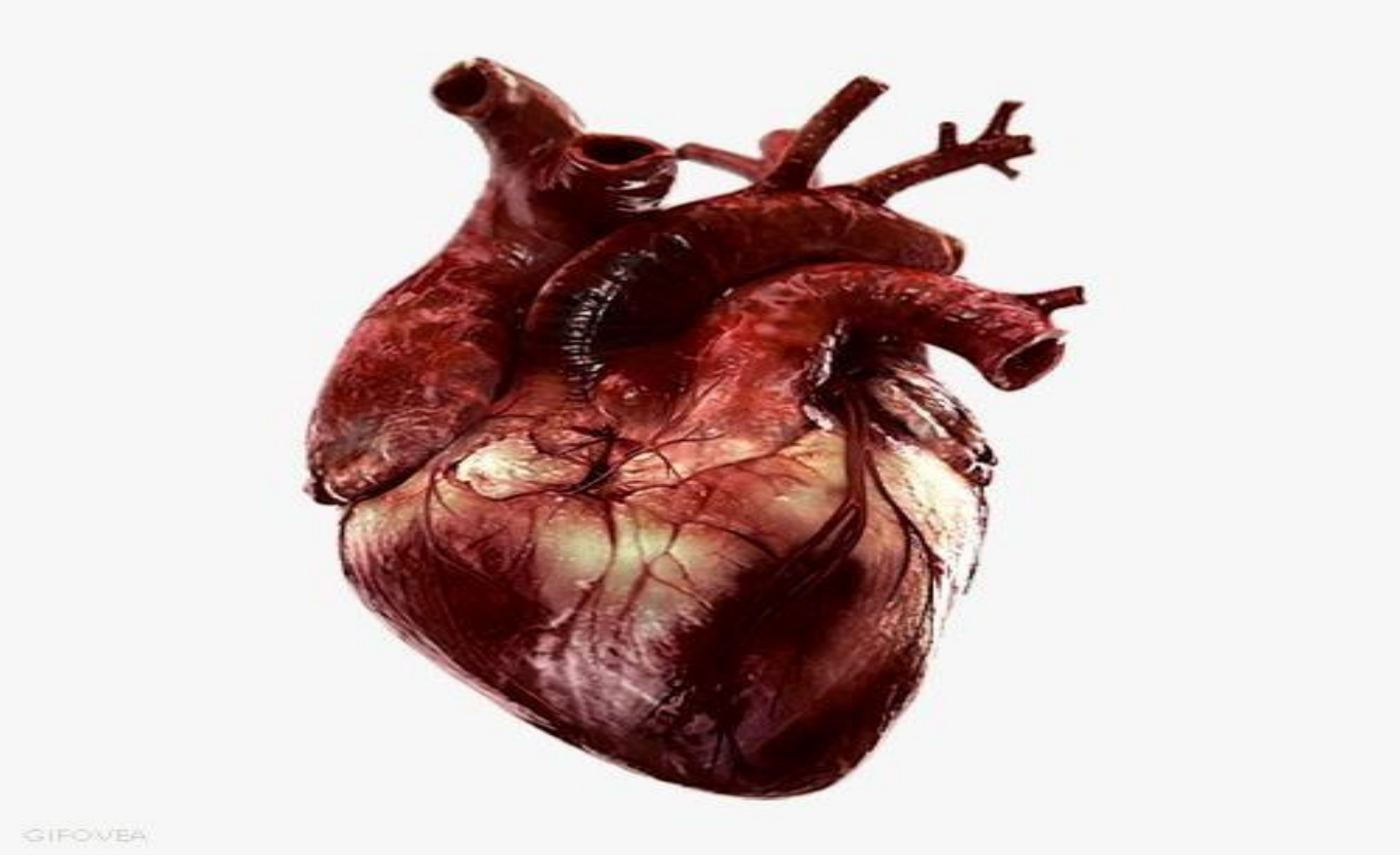
THROAT CULTURES

A single-swab throat culture has a sensitivity of ~85–90%, as defined by isolation of GAS on a second swab.

A throat culture can also be falsely positive for true infection



RHEUMATIC FEVER



WHO guideline on the prevention and diagnosis of rheumatic fever and rheumatic heart disease

Rheumatic heart disease (RHD) is a serious yet preventable public health problem in low- and middle-income countries and in marginalized communities in middle- and high-income countries, including Indigenous populations.

RHD is characterized by chronic structural and/or functional changes in the heart, most commonly in the valves, caused by one or more episodes of rheumatic fever (RF).

RF is an autoimmune inflammatory reaction to throat infections (pharyngitis) or possibly to superficial skin and skin structure infections caused by *Streptococcus pyogenes*, a group A beta-hemolytic *Streptococcus* (GAS)

The first episode of RF is commonly seen in children aged 5 to 15 years.

Recurrent episodes are most common within 1 year of the first episode but can occur throughout the life course.

Most commonly starts in childhood 5-15 years with a diagnostic peak in young adults aged 20 to 39.

It affected an estimated 55 million people globally and caused 360,000 deaths in 2021.

In the twentieth century, the incidence and the prevalence declined substantially in Europe and North America, and in other high-income settings.

However, the gains have not been equitably distributed globally and many regions including sub-Saharan Africa, the Middle East, Central and South Asia, tropical Latin America and the South Pacific continue to have endemic RF and RHD.

There is a higher prevalence among women .

Treatment of group A streptococcal pharyngitis

Recommendation 1

Children, adolescents, and adults with sore throat and a positive diagnostic test or microbial confirmation for GAS pharyngitis should be treated with antibiotics to prevent RF.

Recommendation 2

In populations at moderate to high risk of RF and where diagnostic testing to confirm GAS or microbial confirmation) is not available, children and adolescents with clinically suspected GAS pharyngitis should be treated with antibiotics to prevent RF/RHD.

Recommendation 3

Patients with a positive diagnostic test for GAS pharyngitis or with clinically-suspected GAS:

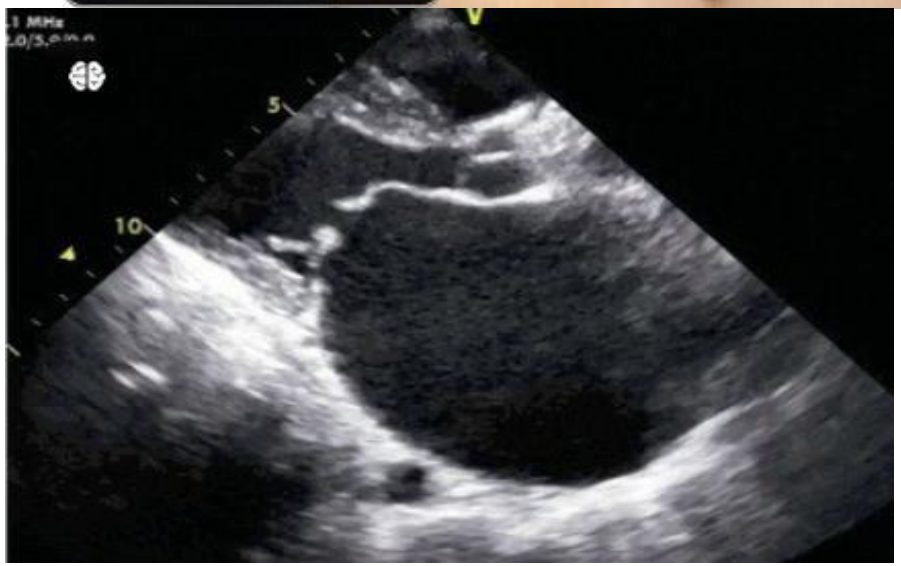
WHO recommends penicillin (intramuscular (IM or oral) as first-line treatment for the prevention of RF.

Diagnosis of rheumatic fever

Recommendation

The Jones criteria should be used for RF diagnosis in children, adolescents, and adults with suspected RF.





Echocardiography in the diagnosis of rheumatic fever and rheumatic heart disease

Recommendation 1

Among children, adolescents, and adults with suspected RF or RHD in settings where standard echocardiography is not available, handheld echocardiography (HHE) can be used for the diagnosis of RF-carditis and RHD.

Prevention of rheumatic fever and rheumatic heart disease

- ***Primordial prevention*** **aims to avoid episodes of superficial streptococcal infection by addressing poverty, improving living conditions and housing standards, and increasing access to health care.**
- ***Primary prevention*** **of RF can be achieved through the effective diagnosis and prompt treatment of GAS pharyngitis and perhaps of GAS superficial skin infections.**
- ***Secondary prevention*** **involves continuous antibiotic prophylaxis given to patients with a previous history of RF/RHD to prevent a recurrence of RF and the onset of RHD, or when RHD has occurred, to limit its progression to more severe disease.**
- ***Tertiary prevention*** **focuses on treating and managing the complications of RHD, such as with medications including anticoagulants, and cardiac interventions including surgery.**

Antibiotic prophylaxis for the prevention of recurrent rheumatic fever

Recommendation 1

Children, adolescents, and adults diagnosed with RF **should be prescribed antibiotic** prophylaxis to prevent 2nd attack.

Recommendation 2

Antibiotic prophylaxis may be prescribed for adults 20 years of age and older found to meet minimum criteria for RHD on echocardiography screening.

Recommendation 3

Antibiotic prophylaxis should be given to children and adolescents who have advanced RF to prevent recurrence.

Recommendation 4-5

IM benzathine benzylpenicillin (BPG), is the first-line approach to prevent recurrence of RF in patients with prior RF or RHD.

Recommendation 5

If an alternative to IM BPG is needed (recommendation 4), oral penicillin is acceptable for RF and RHD prophylaxis.



Recommendation 6-7

Recommendation 6

An oral penicillin test dose may be given prior to IM BPG administration for patients who have a history of mild penicillin allergy; that is, in patients without a prior history of anaphylaxis, angioedema, Steven-Johnson's syndrome or toxic epidermal necrolysis.

Recommendation 7

A local anesthetic may be added to the injectable solution to reduce injection pain in patients who receive IM BPG for secondary prevention of RHD.

SECONDARY PREVENTION

Patients with ARF are at dramatically higher risk than the general population of developing a 2nd attack.

A streptococcal infection, they should receive long-term penicillin prophylaxis to prevent recurrences.

The best antibiotic for secondary prophylaxis is benzathine penicillin G (1.2 million units, or 600,000 units if ≤27 kg) delivered every 4 weeks.

It can be given every 3 weeks, or even every 2 weeks, to persons considered to be at particularly high risk, although, in settings where good compliance with an every-4-week dosing schedule can be achieved, more frequent dosing is rarely needed.

Oral penicillin V (250 mg) can be given twice daily instead **but is less effective than benzathine penicillin G**.

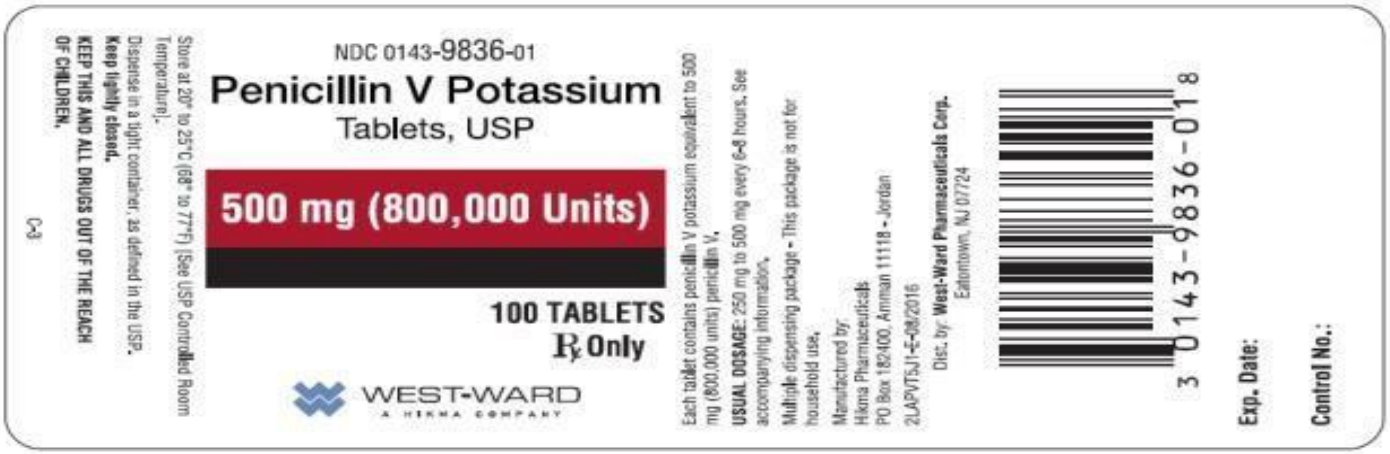
Penicillin-allergic patients can receive

Erythromycin (250 mg) twice daily.

The duration of secondary prophylaxis depends on:

The duration since the last episode of ARF (recurrences become less likely with increasing age)


POM
Erythromycin
250 mg Tablets
28 Tablets
Milpharm
250 mg
Erythromycin
250 mg Tablets
28 Tablets
Milpharm


NDC 0143-9836-01
Penicillin V Potassium
Tablets, USP
500 mg (800,000 Units)
100 TABLETS
℞ Only
WEST-WARD
A HIKMA COMPANY
Each tablet contains penicillin V potassium equivalent to 500 mg (800,000 units) penicillin V.
USUAL DOSAGE: 250 mg to 500 mg every 6-8 hours. See accompanying information.
Multiple dispensing package - This package is not for household use.
Manufactured by:
Hikma Pharmaceuticals
PO Box 182400, Amman 11118 - Jordan
2LAPVT5J1-E-08/2016
Dist. by: West-Ward Pharmaceuticals Corp.
Eatontown, NJ 07724
3 0143-9836-01 8
Exp. Date:
Control No.:
Store at 20° to 25°C (68° to 77°F) [See USP Controlled Room Temperature].
Dispense in a tight container, as defined in the USP.
Keep tightly closed.
KEEP THIS AND ALL DRUGS OUT OF THE REACH OF CHILDREN.
C-3


VIAL
Benzathine Penicillin
600.000 I.U.
Sterile Benzathine Penicillin
B.P/ USP
Use immediately after
reconstitution.
For I.M use only
Asia pharmaceutical industries
VIAL


VIAL
Benzathine Penicillin
1.2 M.I.U.
Sterile Benzathine Penicillin
B.P/USP
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For I.M use only
Benzathine Penic
1.2 M.I.U.

Anti-inflammatory agents for the treatment of rheumatic fever

No recommendation

Thus, WHO does not recommend either for or against the use of anti-inflammatory agents for children, adolescents, and adults diagnosed with RF to prevent the progression to RHD.

These agents include aspirin, non-steroidal anti-inflammatory drugs (NSAIDs), intravenous immunoglobulin and corticosteroids.

2. HOST AND ENVIRONMENTAL FACTORS

(a) AGE: RF is typically a disease of childhood and adolescence (5-15 years) although it also occurs in adults (20 % cases).

The initial attack of RF occurs at a young age,

(b) SEX: both sexes are equally

prognosis is worse for females than for males.

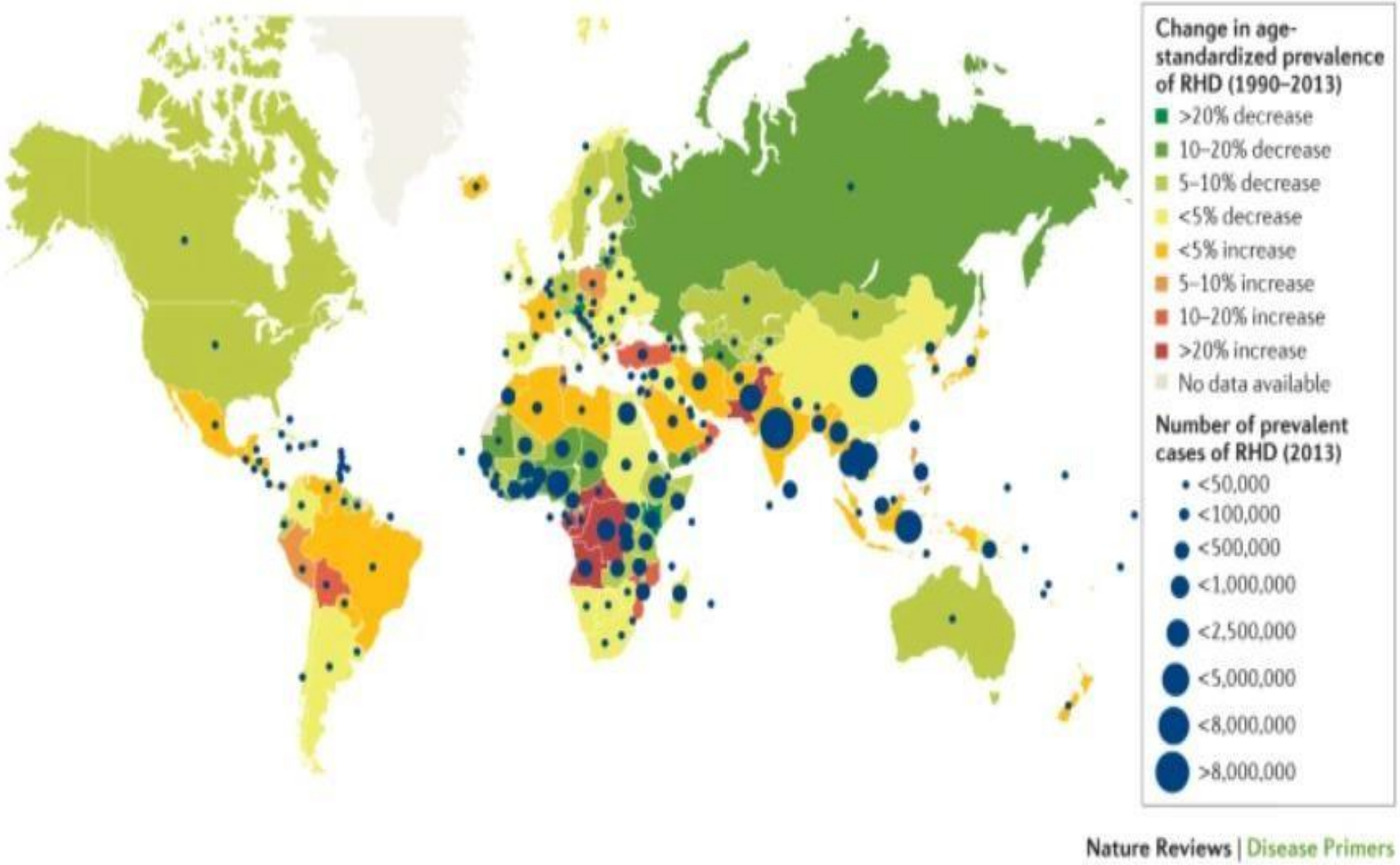
(d) SOCIO-ECONOMIC STATUS :

RF is a social disease linked to

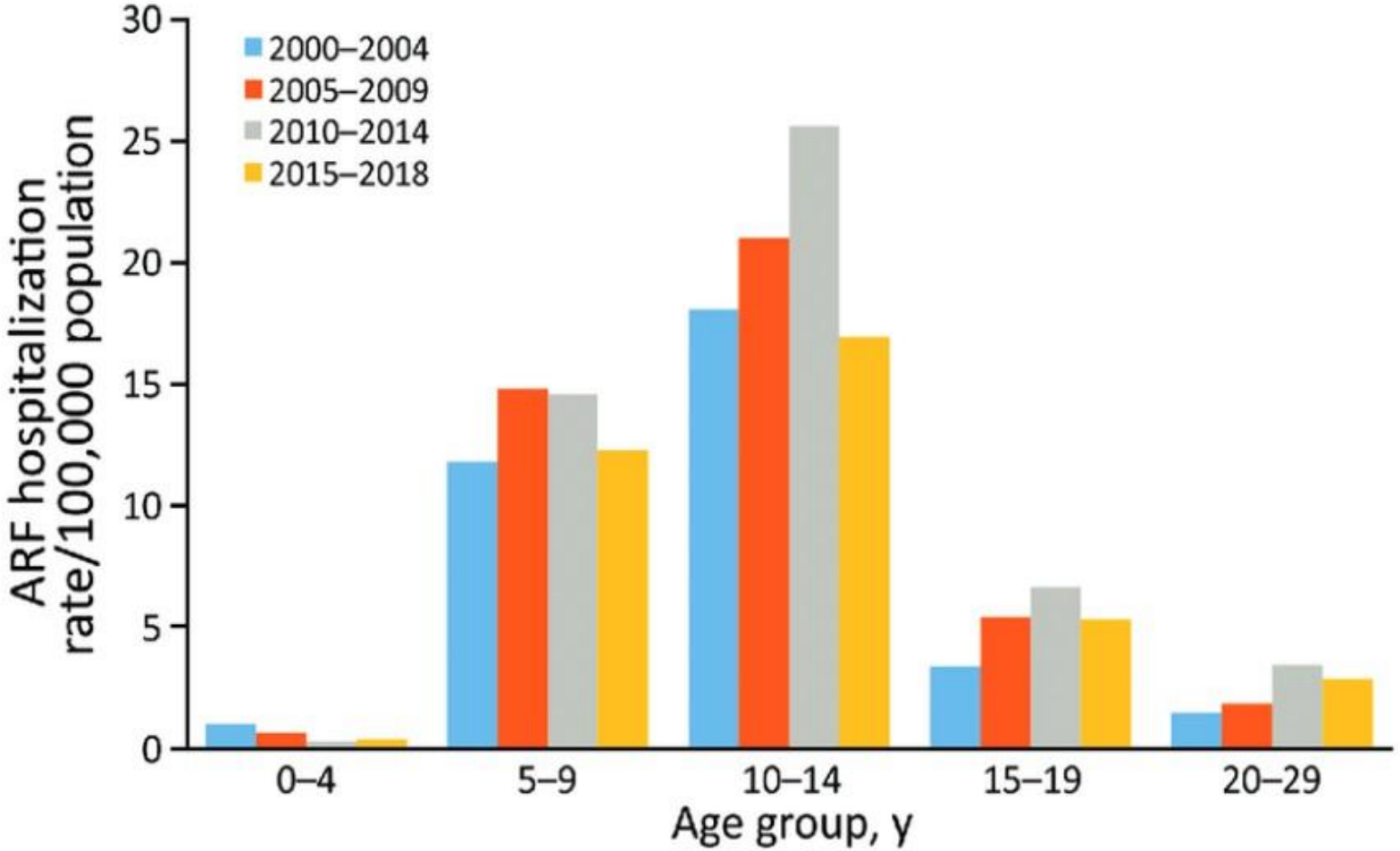
1. **Poverty**
2. **Overcrowding**
3. **Poor housing conditions**
4. **Inadequate health services**
5. **Inadequate expertise of healthcare providers**
6. **low level of awareness of the disease in the community.**

(e) HIGH-RISK GROUPS: The school-age children between 5 and 15 years, those living in a closed community.

Figure 1: The global burden of RHD.

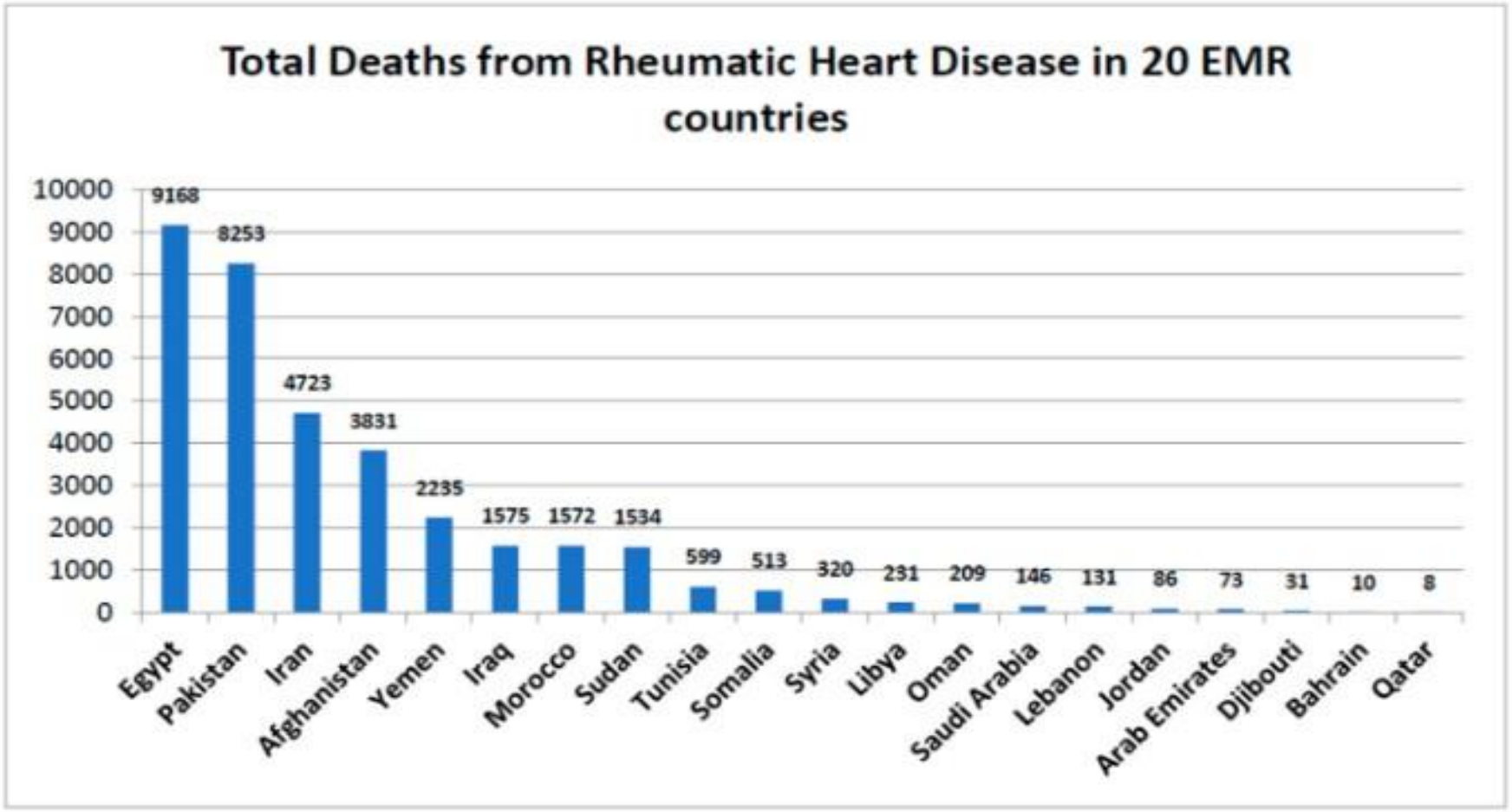


Nature Reviews | Disease Primers



Incidence of initial acute rheumatic fever hospitalizations by age group and time period, New Zealand, 2000-2018. ARF, acute rheumatic fever.

Figure 4. Total deaths from Rheumatic heart disease for the 20 countries with reported data in the Eastern Mediterranean region (Data source (**www.worldlifeexpectancy.com**), based on WHO data in 2014).



Diagnosis of RF: Modified Jones criteria

MAJOR CRITERIA:

- **Carditis**
- **Migratory polyarthritis**
- **Sydenham‘ s chorea**
- **Subcutaneous nodules**
- **Erythema Marginatum**

MINOR CRITERIA:

- **Clinical**
- **Fever**
- **Arthritis**

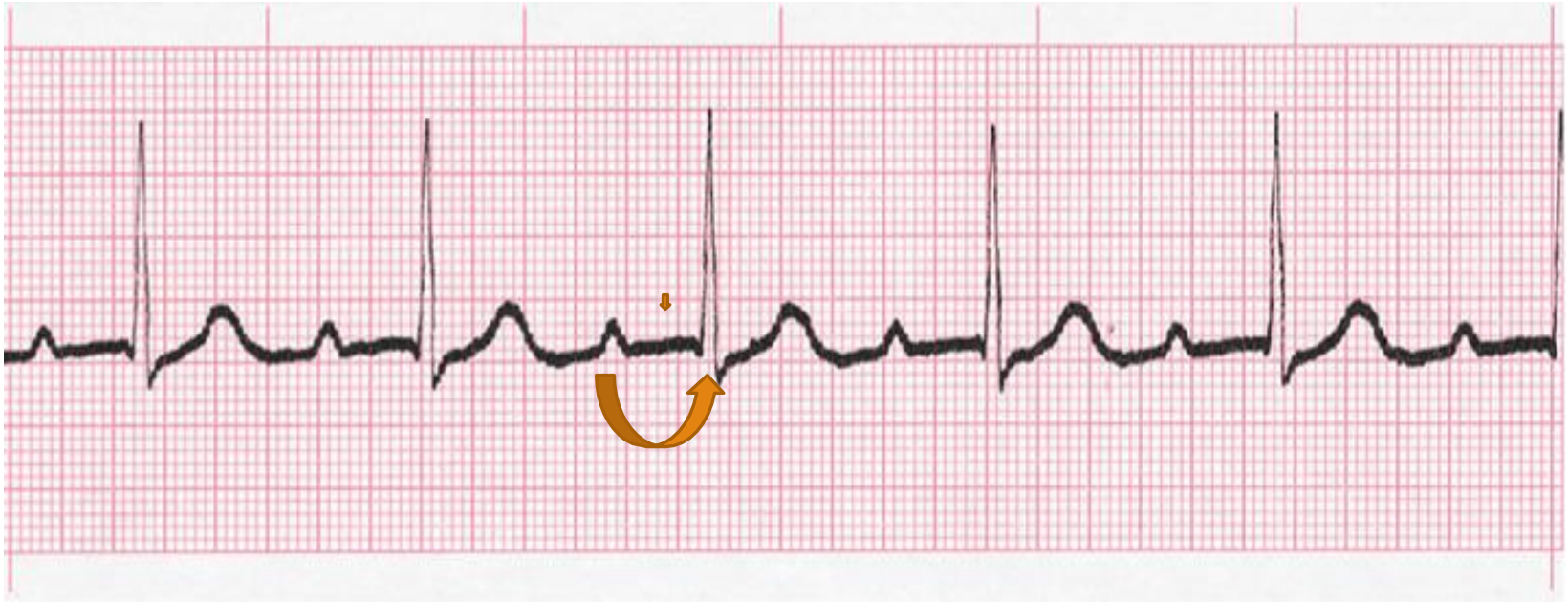
Laboratory

Elevated acute phase protein

Prolonged PR interval=

1st degree heart block

First degree heart block



Plus

Evidence of recent group A streptococcal infection :

A. **positive culture**
B. **Rapid antigen detection test.**
C. **Elevated or increasing streptococcal antibody test.**

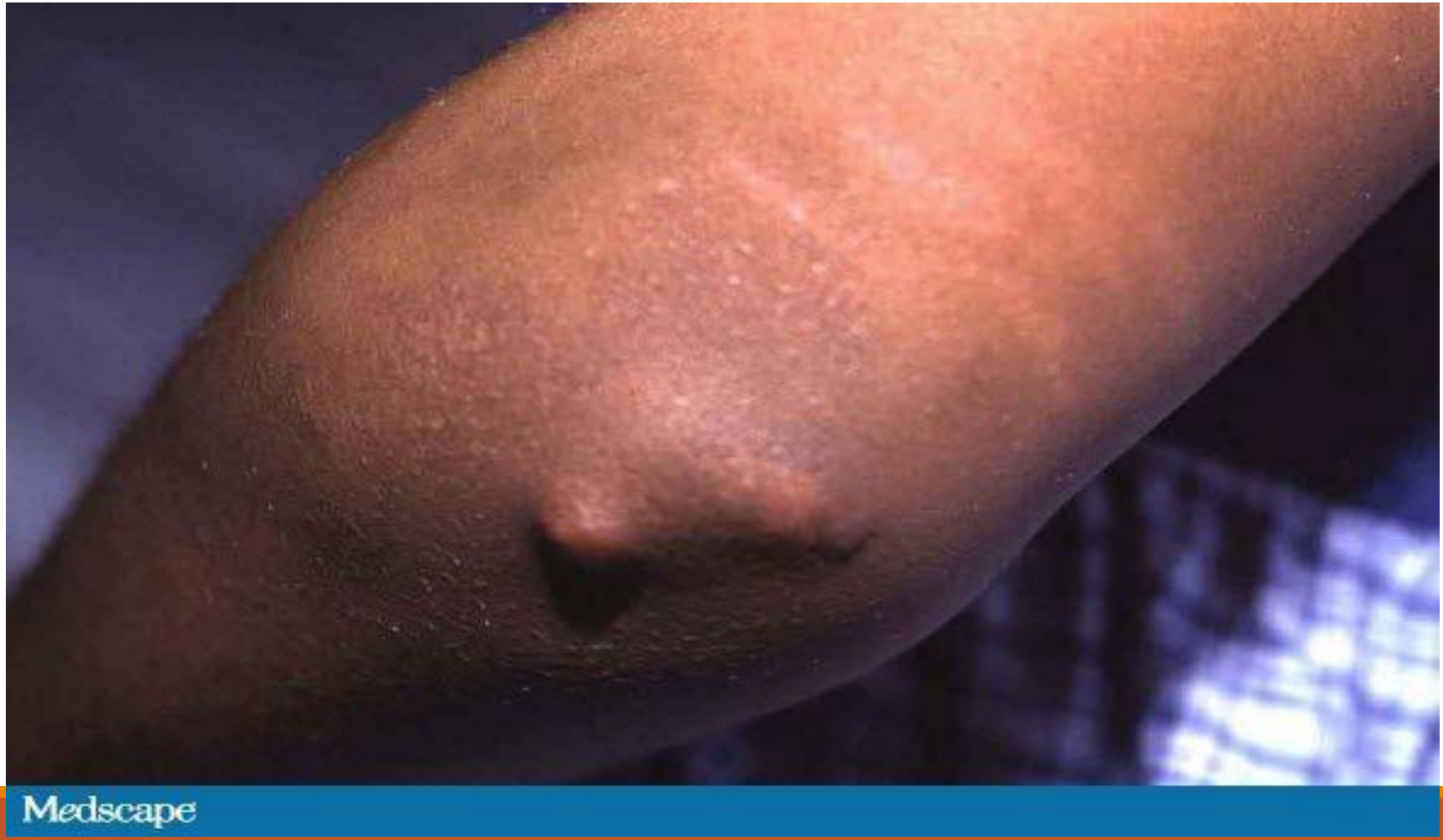
Erythema marginatum







Subcutaneous nodules



Sydenham's Chorea



80% of patients with ARF have an elevated anti- Streptolysin O titer (ASOT) at presentation.

A normal value less than 200 Todds unit

One of the following is considered as first-line in the treatment of RF:

A. AZITHROMYCIN
B. BENZATHINE PENICILLIN
C. PROACIN PENICILLIN
D. BENZYL PENICILLIN
E. LEVOFLOXACIN

REFERENCES:

1. **Park,s Text Book Of Preventive And Social Medicine 23rd Edition**

2. **Republic of Iraq Ministry of Health Public Health Directorate Communicable Diseases Control Center**

3. **WHO guideline on the prevention and diagnosis of rheumatic fever and rheumatic heart disease ISBN 978-92-4-010007-7 (electronic version)**