Upper Respiratory Infections in Athletes

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Exercise and Immune System

Exercise and changes in immunity have a proven relationship [5]. Very heavy sports may increase risk of infections, such as respiratory tract infections. These risks are high especially during 1-2 weeks after heavy training [6]. In a marathon, 33.3% of athletes who ended the marathon got an upper respiratory tract infection (URI) during the first two weeks [7]. There are two theories regarding sports and the immune system. Some experts hypothesized a J-shaped relationship between physical activity and respiratory tract infection. According to this theory, regular, moderate activity strengthens the immune system and decreases rate of viral infection. While severe, prolonged activity (including marathon) has a transient inhibitory effect on immune system which may predispose athletes to URI and malignancy[8]. According to the second theory, immune system function is suppressed for at least several hours after intensive exercise, this time is an “open window” and the risk of infections may be increased in this period[5]. However, despite these attractive theories, there are a few studies which evaluate the effect of exercise on different parts of immune system [5, 6, 9].

Exercise may influence quality and quantity of different types of white blood cells including natural killer (NK) cells, neutrophils and lymphocytes. After heavy exercise, NK cells increase immediately, and fall below pre-exercise level after 30 min which probably is not clinically important. Heavy exercise does accompany a decreased cytotoxic effect of NK cells while moderate, regular activity increases number of NK cells [8, 10].

Neutrophil counts increase after exercise but high-intensity activities impair neutrophil function. Lymphocyte counts and B-cell function are decreased after heavy exercise but moderate exercise increases them [4].

Salivary IgA decreases with heavy and prolonged activities but IgG level has a small decrease. While low-intensity short term exercise increases the secretory IgA transiently [11]. A ratio of CD4 to CD8 decrease to <1.5 following exercise. In acute exercise, proinflammatory cytokines such as tumor necrosis factor (TNF) α, interleukin (IL) 1 and IL6 and anti-inflammatory cytokines such as IL10, IL1 receptor antagonist increased [9]. Physical activity may also influence the filtering system of respiratory tract. High flow air and change of breathing from nose to mouth breathing induces progressive cooling and drying of the respiratory tract mucous. Decreasing movement of ciliated cells and increasing mucosal viscosity, finally impairing filtering of microorganisms from the upper respiratory tract system [10].

In summary athletes have brief immunosupression after acute, heavy exercise in the open window period, when there is reduced ciliary activity, lymphocyte count, CD4 to CD8 ratio and mucosal IgA level. Indeed, intensive activity is associated with increased risk of infection. According to J curve, regular moderate exercise can reduce respiratory tract infections.

Microorganisms vary by size, the length of time that they survive on surfaces or in the air and the method of getting around.

Upper Respiratory Infections in Athletes

Upper respiratory tract infection is one of the most common diseases in humans, with a high prevalence in athletes. It is the reason of 30-40% of referrals to sports medicine clinics [12]. Healthy adult get URI up to six times annually. Higher incidence (>four times annually) of URI in athletes is not a fact but it is observed in a lot of studies [13–16]. It is more prevalent in athletes with heavy exercise comparing with those with moderate to low activity [12, 16]. Different families of viruses cause URI including rhinoviruses, coronaviruses, respiratory syncytial, Para influenza and Influenza. Close contact with infected patients is the main way of transmission. Transmission through aerosols has been approved for rhinoviruses and influenza [17]. Higher prevalence of common cold in high contact sports including wrestling is predictable. Water sports such as swimming, predispose athletes to sinusitis, otitis and conjunctivitis. Due to different etiologies, clinical syndrome is different and could be presented as rino-sinusitis, bronchitis, flu-like or croup. Upper respiratory infection is self limited and most patients recover within 3 to 5 days with or without symptomatic treatment. Basic hygiene practices and limiting exposure to infected persons are important in the prevention of URI [2].

As we mentioned before, the relationship between physical activity and URI has been described in the form of a J curve. This model suggests that although moderate exercise training may reduce URI symptomatology, heavy chronic exertion may increase it.

When Should Athletes Return to Training and Competition After Respiratory Tract Infections?

Effect of physical activity on the symptomatology of URI is different and depends on the severity of physical activity and disease. In athletes with mild to moderate URI with rinorrhea, sore throat and cough (upper the neck syndrome) there is no evidence of more severity, complication or duration of disease following physical activity. However in athletes who have fever, myalgia, arthralgia and tachycardia (lower the neck syndrome), physical activity may increase the severity and duration of the respiratory tract infection. On the other hand, isometric and dynamic contractions may decrease in patients with fever. In this case, bed rest until complete recovery (normal heart rate and body temperature) is recommended [18].

If sore throat is due to infection with Epstein bar virus (EBV), light physical activity could be started three weeks from symptoms onset. Although return to contact activities is more controversial because of the risk of splenic rupture following minor abdominal trauma even in patients with no splenomegaly [19]. In patients with sinusitis and otitis media, diving is forbidden until complete recovery of signs and symptoms and a normal tympanogram in the latter group. Diving is also contraindicated in swimmers with chronic otitis media with tympanostomy tube (Grommets). Athletes with conjunctivitis may transmit infection to the competitors during contact sports (including wrestling) and should not return to sports until complete recovery. Swimmers with adenovirus conjunctivitis are also prohibited from sport.

Heavy exercise in athletes with acute bronchitis is forbidden due to increased risk of bronco-spasm and secondary bacterial infection. Athletes with acute bacterial pneumonia need at least two weeks rest before full return to physical activity. However it makes 4- 6 weeks in patients with pneumococcal pneumonia. Chest X ray has no role in determining the time to return to sport. Return to sport should be gradually and in response to signs and symptoms. Athletes should perform 10-14 days of mild exercise then start up training. In general, athletes should do two days of light exercise for every day of rest.

How can Radic8 Help?

Radic8 is the highest certified clean air technology in the world and has a kill rate on ALL known respiratory viruses of 99.9999%.

- Respiratory infections are the most common ailment in sports
- Athletes are more susceptible to respiratory infections
- Respiratory infections are transmitted through contact and air
- Hand and Surface sanitization practices are common – but what about air?

****If you want to decrease Sickness in Sports – use Radic8 to clean the air****