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A Review article of Streptococcus pyogenes infection: Rick factors, prevention and management strategies

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Abstract

Background:-Streptococcus pyogenes is an exclusively human pathogen. This bacterial species is responsible for a large variety of infections.

Objective: This review identified published articles on the risk factors, prevention and control strategies for streptococcus diseases.

Material and methods: A systematic search was carried out to identify papers published on the Web of Science, PubMed, Scopus, and Google Scholar electronic databases in an attempt to provide basic information about Streptococcus infections, potential risks for their spread, and treatment and prevention strategies.

Results: The more common methods for Streptococcus pyogenes transmission are through respiratory droplets, skin lesions brought on by Streptococcus pyogenes contact with infected objects or devices. Another potential mode is foodborne transmission but more research is needed to determine this infection route. Native communities, and those of low socio-economic status worldwide were found particularly susceptible to Streptococcus diseases, as well as children, older adults and those with impaired immune system. Those groups are susceptible to Streptococcus pyogenes infections and their complications with higher infectious rates in educational institutions, hospitals, over-crowding and the continuous increase in social contact. The importance of improving living conditions and personal and hand hygiene is one of the techniques in the management and prevention of Streptococcus pyogenes infections. Infection control methods must be highlighted with greater precision.

Conclusion: Prevention and control measures should target the improvement of living conditions, and personal and hand hygiene. Adherence to infection prevention and control practices should be emphasized in high-risk settings.

Keywords: Prevention and management strategies, infections, Streptococcus pyogenes.

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Introduction:

Streptococcus pyogenes is a Gram-positive bacterial pathogen that can cause invasive, non-invasive and non-suppurative disease. These conditions involve pharyngitis, scarlet fever, impetigo, cellulitis, type II necrotizing fasciitis, streptococcal toxic shock syndrome, ARFand post-streptococcal glomerulonephritis [1]. Today, almost 18.1 million people are influenced by Streptococcus pyogenes disease, with 1.78 million cases and 500,000 deaths occurring each year [2]. The incidence of Streptococcus pyogenes disease decreased in developed countries during the twentieth century, owing largely to better living conditions [3]. Even so, genetic modifications in Streptococcus pyogenes strains circulating in the environment, as well as changes in infection susceptibility of the host, can result in dramatic increases in disease rates [4, 5]. In, addition to the global spread of Streptococcus pyogenes. [6].

According to epidemiological studies, these diseases have resurfaced in developed countries. In the United States, invasive Streptococcus pyogenes infection rates remained stable between 2005 and 2012, with 3.8 cases per 100,000 people, resulting in 1116 deaths per year [7]. In 2015, there were more than 15,000 Streptococcus pyogenes cases reported in the United States, with 1,600 deaths [8]. According to reports, Streptococcus pyogenes is also on the rise in Canada. The prevalence of Streptococcus pyogenes in Canada was 5.24 per 100,000 people in 2015, up from 2.4 cases per 100,000 people in 2003 [9, 10]. In the United Kingdom, the prevalence rate of Streptococcus pyogenes has already been reported to be 2.9 cases per 100,000 person-years [11, 12]. Streptococcus pyogenes infections and their associated sequelae are more common in smaller populations [13]. This includes all developing countries as well as the disadvantaged groups in developed countries [12]. General management guidelines are critical to preventing the spread of Streptococcus pyogenes

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infection, especially among populations at risk. The objective of this study was to identify all potential population risks as well as to review potential global health prevention and control strategies. Learning about the risk factors for transmission will help inform public health policy and slow the spread of Streptococcus pyogenes.

Materials and Methods:

Articles focusing on the isolation of various Streptococcus pyogenes genetic variants in labs and the treatment of Streptococcus infections were also rejected. Because the goals of this paper were to provide basic information about Streptococcus infections, potential risks for their spread, and treatment and prevention strategies. All studies that met the presence requirements would be included, despite the flaws that are viewed in the research approach.

Results:

Explain the issues surrounding community health as well as the techniques for preventing and control Streptococcus pyogenes disease that can be found in the published papers Conditions of high prevalence: Streptococcus pyogenes infections have been found to be common in developing countries [14], as well as among indigenous populations in developed countries [14], and to be widespread in poor groups [15, 16]. Streptococcus pyogenes are also common in high-income groups, such as schools and care facilities, in which people are in close contact to one another for a long time [17, 18]. Disease transmission: According to the reviewed reports, the main ways in which Streptococcus pyogenes infection spreads are through respiratory secretions and close exposure to infected people and contaminated objects. Contaminated food has only recently been recognized as yet another potential channel for transmission [19, 20, and 21].

At-Risk groups: The population groups most susceptible to Streptococcus diseases are those with pre-existing medical conditions [22], children (0-15 years) [23], and the elderly [24]. Women who have recently given birth and those who are pregnant have both been identified as streptococcus infection vulnerable populations [25]. Young boys and elderly men were reported to have a higher risk of contracting Streptococcus pyogenes infection when biological sex was considered [26, 27). Common Environments of Exposure: Streptococcus pyogenes pathogens were much more frequent in childcare centers, primary schools [28], healthcare facilities [29], shelters for the homeless [30], daycare centers [31], and establishments for combat academy [32]. Risk Components: An important risk factor for Streptococcus pyogenes diseases was found to be inadequate housing. Poor nutrition [33], overcrowding in the house [34], sharing of everyday items [35], and unfavorable housing conditions like moisture, poor air circulation, and low indoor temperature [21]. Risk factors include being of a low socioeconomic status [21], exposure to tobacco smoke pollution [36], and exposure to insect bites or having skin conditions or injuries [37]. There have been changes in the occurrence of Streptococcus pyogenes diseases, according to numerous studies [38]. Poor infection control procedures, which lead to cross-infection by medical staff with various residents or patients and contamination of clinic machinery and devices were found to be factors that contributed to the transmission of Streptococcus pyogenes in clinics and nursing homes. Poor hand and personal hygiene [39] and direct contact with subclinical individuals [40] had also been found to be risk factors for Streptococcus pyogenes infections. These symptoms and signs frequently made home contacts more likely to contract the disease [40]. Pregnancy [41], underlying medical conditions [42], malnutrition [43], and abuse of illegal drugs or alcohol [44] are examples of personal risk factors.

Techniques for avoiding transmission and management A number of researches [41, 45] have established that early identification and treatment of cases are effective means to avoid spread of Streptococcus pyogenes pathogens. In hospitals and care facilities, Streptococcus infection transmission must be avoided at all costs through the use of efficient infection control procedures. It is also possible to asymptomatic cases, such as those in healthcare workers, and include comment prophylaxis for vulnerable groups [46]. The significance of enhanced numerous studies and monitoring research was spotlighted in a variety of articles [47]. This could be helped by improved detection techniques [48] and community and hospital and awareness raising, including the training for healthcare professionals and instruction on the correct diagnosis and treatment of Streptococcus pyogenes diseases [46]. Vaccination [49,50] and screening for Streptococcus pyogenes during pregnancy [51] are two other unconfirmed strategies to lower the spread of Streptococcus pyogenes. [51]

Discussion:

Prevalence of disease in countries Streptococcus pyogenes remains a leading cause of morbidity and mortality worldwide predominantly among young adults and children from poor countries [52]. Streptococcus pyogenes continues to affect the disadvantaged countries like the USA and Australia have large populations in addition to those in low- and middle-income countries. Streptococcus pyogenes is still prevalent in most developed countries. This review claims that several genetic variants of Streptococcus pyogenes are attributable to the spread of infection [14]. There are different types of Streptococcus pyogenes in developing and developed countries. The diversity of Streptococcus pyogenes is greater in low-income settings than in high-income settings. [53].

Transmission of the infection

When selecting the best management approaches, transmission modes are essential information on

which management should be based. For every Streptococcus pyogenes disease, there are various methods of transmission. Streptococcus pyogenes is only found in humans naturally, and in the carrier state, it is frequently found on the skin, vagina, pharynx, and anus [54]. Respiratory or skin exposure to secretions from infected ulcers [55] is the main way of transmission. Contaminated tools, surfaces, and materials, act as a reservoir and a transmission vehicle. There are currently only a few studies [56,57] that look at surfaces. [58, 59].

Places of Infection transmission:

The infection is transmitted more in schools, nurseries and kindergartens, as well as hospitals and nursing homes [30]. Researchers recorded scarlet fever prevalence data from 2005 to 2015 and found that the infection was most common during the school mpnths [7]. Infections from other patients and medical personnel have also been implicated, as well as poor surgical techniques, contaminated medical instruments or hospital environments, in addition to other factors [60,32].

At Risk Groups:

streptococcus pyogenes can affect anyone in any group [61,62], but are more common in children and the elderly, as has been shown in this review [23]. A review of scarlet fever cases in Hong Kong from 2005 to 2015 revealed a higher frequency among children 5-15 years of age, with children 3-5 years of age (nursery age) being most at risk [28,63]. As stated by the results of a study by Rotten Streich et al [64], pregnant women are twenty times more likely to develop streptococcal infections than non-pregnant women, which has been linked to changes in host immunity caused by pregnancy or postpartum condition [65]. Moreover, contaminated medical instruments used for cesarean sections expose pregnant women to streptococcal infection [57]. Lactation also declines the availability of protective vaginal flora such as lactobacilli, which raises the risk of the development of other microorganisms such as Streptococcus pyogenes [62]. The review found that men had a higher incidence of Streptococcus pyogenes infection than women [33]

Risk elements for Streptococcus Infections:

A variety of factors influence Streptococcus Infections transmission. Streptococcus Infections is primarily a disease of poverty [3]. Overcrowding, dampness, poor ventilation, and the lack of temperature control in the house lead to the spread of this infection [66]. Overcrowding, particularly in homes, camps, and different institutions such as nursing homes, is an important environmental factor in the spread of streptococcal infection [66], as evidenced by this review. A cough or a sneeze from an infected person in a room can easily infect others, and because these bacteria are believed to live on dry surfaces and materials for up to 6.5 months, they are more likely to spread in crowded environments [67]. Contamination in nursing homes and hospitals is just another risk factor identified by the review, and it must be emphasized if an infection is to be controlled. This contamination is almost standard on hospital equipment and surroundings such as drapes, furniture, walls, and floors [60]. Contamination from healthcare workers can also occur as a result of poor infection control practices [46]. Household exposure to people with no apparent symptoms or frank cases of Streptococcus Infections can also occur. As already mentioned, this exposure is common in overcrowded places. Moreover, family's limited resources, such as those related to laundry contribute to the bacterial load on the skin of family members or objects in the house, which leads to increased transmission. Moreover, sharing of bedding and personal items such as towels is a risk factor for the spread of streptococcal infection [52]. large numbers of public contacts, is a key factor for widespread transmission in schools, hospitals, and other closed public places [32].

Control and Prevention Measures/Strategies:

Streptococcus pathogen prevention and treatment techniques should be practical, available and cheap, particularly in low-income settings [3]. However, the majority of available programs are focused on intervention, and there is little data on potential infection prevention strategies in the community. They include infectious disease research with improved surveillance systems and [68] housing quality [21]. Good hygiene practices are also important in transmission control, particularly among boys, who are more exposed than girls [28]. Use of saliva-contaminated items like, carafe water, cup and pots increases the risk [35]. In all settings, mostly in high risk transmission areas, sanitation must be maintained, including surface cleaning [69]. Streptococcus pyogenes can be destroyed if exposed to wet heat of 121°C for at least 15 minutes and dry heat of 170°C for at least an hour [70]. Raised infectious, immune stimulatory diversity among serogroups security matter, and a Uncertainty about the clinical termination points of a proof-of-concept trial [71]. The expansion and use of vaccination on the other hand, is highly promoted as it has the ability to help decrease these diseases [72]. Most studies and countries take as a priority clinical disease management over community-level disease prevention. It is challenging to conduct informed public health and research initiatives aimed at lessening the impact of Streptococcus pyogenes diseases because these illnesses are not always reportable. Efforts to get better decision systems and registry at the community and national levels improve health interventions.

Conclusions:

Streptococcus disease and its outcome are a major health concern. On the other hand, Streptococcus pyogenes is prevalent in developing countries as well as minimum socioeconomic areas and home-grown populations in advanced countries. Streptococcus pyogenes prohibition should be a preference in nation health policies. fundamentally refers to direct relationships between of respiratory secretions with skin pests caused by Streptococcus

pyogenes, or polluted bodies or organs. Streptococcus is especially raised in school-age children and prevention programs should target this population because streptococcal diseases can be infected with it. Influencing children's education and, as a result, their development, creating a cycle of disease and deprivation. Public health preventive measures must be strengthened in order to break the cycle. Streptococcus pyogenes diseases must be reported at the national level in order to guide strategies in global health and study aimed at minimizing their effects. To improve living conditions and thus reduce the burden of infectious diseases such as Streptococcus pyogenes infection, governments must consider greater fairness in the allocation of resources. In addition, steps must be taken to ensure that everyone has access to excellent medical care because Streptococcus pyogenes can be treated promptly to reduce the period of transmission of the bacteria and reduce morbidity and mortality

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Authors' contribution:
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References:
1. Kimberlin DW, Brady MT, Jackson MA. Group A Streptococcal Infections; American Academy of Pediatrics: Itasca, IL, USA, 2015; pp. 732–744.
2. World Health Organization. The Current Evidence for the Burden of Group A Streptococcal Diseases; World Health Organization: Geneva, Switzerland, 2005.
3. Ralph AP, Carapetis JR. Group A streptococcal diseases and their global burden. In Host-Pathogen Interactions in Streptococcal Diseases; Springer: Berlin/Heidelberg, Germany, 2012; pp. 1–27.
4. Nabat Z N, Alateef BA. and Hussain IM. Bacteriological and Immunological Study of Patients with Tonsillitis in Hila City. Iraqi Journal of Biotechnology.(2019) 18(2): 252-260.
5. You Y, Davies MR, Protani M, McIntyre L, Walker MJ, Zhang J. Scarlet fever epidemic in China caused by Streptococcus pyogenes serotype M12: Epidemiologic and molecular analysis. EBioMedicine 2018, 28, 128–135. [CrossRef]
6. Tagini F, Aubert B, Troillet N, Pillonel T, Praz G, Crisinel P, et al. Importance of whole genome sequencing for the assessment of outbreaks in diagnostic laboratories: Analysis of a case series of invasive Streptococcus pyogenes infections. Eur. J. Clin. Microbiol. Infect. Dis. 2017, 36, 1173–1180. [CrossRef]
7. Zhang Q, Liu W, Ma W, Shi Y, Wu Y, Li Y, et al. Spatiotemporal epidemiology of scarlet fever in Jiangsu Province, China, 2005–2015. BMC Infect. Dis. 2017, 17, 596. [CrossRef]
8. Nelson GE, Pondo T, Toews KA, Farley MM, Lindegren ML, Lynfield R, et al. Epidemiology of invasive group A streptococcal infections in the United States, 2005–2012. Rev. Infect. Dis. 2016, 63, 478–486. [CrossRef] [PubMed].
9. Mosites E, Frick A, Gounder P, Castrodale L, Li Y, Rudolph K, et al. Outbreak of invasive infections from subtype emm26. 3 group A streptococcus among homeless adults—Anchorage, Alaska, 2016–2017. Clin. Infect. Dis. 2018, 66, 1068–1074. [CrossRef]
10. Fahad HM. Types of Aerobic Bacteria Isolated from Iraqi Patients with Acute Tonsillitis and their Susceptibility to Different Antibiotics. J. Pure Appl. Microbiol. 12(4): 1-5.
11. Tyrrell GJ, Fathima S, Kakulphimp J, Bell C. Increasing rates of invasive group A streptococcal disease in Alberta, Canada; 2003–2017. In Open Forum Infectious Diseases; Oxford University Press: New York, NY, USA, 2018; p. ofy177.
12. Mahdi AZ, Hassan JH and Jebur KS. Antibiotic Susceptibility of Streptococcus pyogenes Isolated from Otitis Media and Tonsillitis among Children Patients. Int.J.Curr.Microbiol.App.Sci ;2017 : 6(8): 998-1004.
13. Watts V, Balasegaram S, Brown CS, Mathew S, Mearkle R, Ready D, et al. Increased risk for invasive group A streptococcus disease for household contacts of scarlet fever cases, England, 2011–2016. Emerg. Infect. Dis. 2019, 25, 529. [CrossRef] [PubMed]
14. Barnett T, Bowen A, Carapetis JR The fall and rise of group A streptococcus diseases. Epidemiol. Infect. 2019, 147, e4. [CrossRef] [PubMed]
15. Al-Shwany ZHS, Al-Jebori ISA. Molecular Study of Sortase Enzyme in Streptococcus pyogenes Isolated from patients with Tonsillitis in Kirkuk City. Kirkuk University Journal / Scientific Studies (KUJSS),2015, Volume 10, Issue 2, p.p(227-241) ,ISSN 1992 – 0849.
16. Carapetis JR, Steer AC, Mulholland EK, Weber M. The global burden of group A streptococcal diseases. Lancet Infect. Dis. 2005, 5, 685–694. [CrossRef]
17. Nanduri S, Metcalf B, Arwady M, Edens C, Lavin M, Morgan J, et al. Prolonged and large outbreak of invasive group A Streptococcus disease within a nursing home: Repeated intrafacility transmission of a single strain. Clin. Microbiol. Infect. 2019, 25, 248.e1–248.e7. [CrossRef]
18. May PJ, Bowen AC, Carapetis JR. The inequitable burden of group A streptococcal diseases in Indigenous Australians. Med. J. Aust. 2016, 205, 201–203. [CrossRef] [PubMed]
19. Chen M, Wang W, Tu L, Zheng Y, Pan H, Wang G, et al. An emm5 group A streptococcal outbreak among workers in a factory manufacturing telephone accessories. Front. Microbiol. 2017, 8, 1156. [CrossRef] [PubMed].
20. Shakoor S, Khan E, Mir F, Malik F, Jamil B. Secular trends of Streptococcus pyogenes sepsis in Pakistan and analysis of clinical features in a

hospitalized cohort. Trop. Biomed. 2017, 34, 648–656.
21. Oliver JR, Pierse N, Stefanogiannis N, Jackson C, Baker MG. Acute rheumatic fever and exposure to poor housing conditions in New Zealand: A descriptive study. Paediatr. Child Health 2017, 53, 358–364. [CrossRef] [PubMed]
22. Athey TB, Teatero S, Sieswerda LE, Gubbay JB, Marchand-Austin A, Li A, et al. High incidence of invasive group A Streptococcus disease caused by strains of uncommon emm types in Thunder Bay, Ontario, Canada. J. Clin. Microbiol. 2016, 54, 83–92. [CrossRef] [PubMed]
23. Cannon J, Abouzeid M, de Klerk N, Dibben C, Carapetis J, Katzenellenbogen J. Environmental and social determinants of acute rheumatic fever: A longitudinal cohort study. Epidemiol. Infect. 2019, 147. [CrossRef]
24. Saavedra-Campos M, Simone B, Balasegaram S, Wright A, Usdin M, Lamagni T. Estimating the risk of invasive group A streptococcus infection in care home residents in England, 2009–2010. Epidemiol. Infect. 2017, 145, 2759–2765. [CrossRef]
25. Dickinson H, Reacher M, Nazareth B, Eagle H, Fowler D, Underwood A, et al. Whole-genome sequencing in the investigation of recurrent invasive group A streptococcus outbreaks in a maternity unit. J. Hosp. Infect. 2019, 101, 320–326. [CrossRef] [PubMed]
26. Liu Y, Chan TC, Yap LW, Luo Y, Xu W, Qin S, et al. Resurgence of scarlet fever in China: A 13-year population-based surveillance study. Lancet Infect. Dis. 2018, 18, 903–912. [CrossRef] .
27. Abidali, ZN,. Immunological and molecular study of the bacteria that cause Tonsillitis. Master thesis. College of Science for Girls Babylon University, Iraq.(2014)
28. Lee CF, Cowling BJ, Lau EH. Epidemiology of reemerging scarlet fever, Hong Kong, 2005–2015. Emerg. Infect. Dis. 2017, 23, 1707. [CrossRef]
29. Chalker VJ, Smith A, Al-Shahib A, Botchway S, Macdonald E, Daniel R, et al. Integration of genomic and other epidemiologic data to investigate and control a cross-institutional outbreak of Streptococcus pyogenes. Emerg. Infect. Dis. 2016, 22, 973. [CrossRef]
30. Dohoo C, Stuart R, Finkelstein M, Bradley K, Gournis E. Risk factors associated with group A streptococcus acquisition in a large, urban homeless shelter outbreak. Can. J. Public Health 2020, 111, 117–124. [CrossRef] [PubMed]
31. Worthing KA, Werno A, Pink R, McIntyre L, Carter GP, Williamson DA, et al. Biphasic outbreak of invasive group A Streptococcus disease in eldercare facility, New Zealand. Emerg. Infect. Dis. 2020, 26, 841. [CrossRef]
32. Hammond-Collins K, Strauss B, Barnes K, Demczuk W, Domingo MC, Lamontagne MC, et al. Group A streptococcus outbreak in a canadian armed forces training facility. Mil. Med. 2019, 184, e197–e204. [CrossRef] [PubMed]
33. Teatero S, McGeer A, Tyrrell GJ, Hoang L, Smadi H, Domingo MC, et al. Canada-wide epidemic of emm74 group A streptococcus invasive disease. In Open Forum Infectious Diseases; Oxford University Press: New York, NY, USA, 2018; p. ofy085.
34. Cannon J, Abouzeid M, de Klerk N, Dibben C, Carapetis J, Katzenellenbogen J. Environmental and social determinants of acute rheumatic fever: A longitudinal cohort study. Epidemiol. Infect. 2019, 147. [CrossRef]
35. Adebanjo T, Mosites E, Van Beneden CA, Onukwube J, Blum M, Harper M, et al. Risk factors for group A streptococcus colonization during an outbreak among people experiencing homelessness in Anchorage, Alaska, 2017. Clin. Infect. Dis. 2018, 67, 1784–1787. [CrossRef]
36. Bennett J, Moreland NJ, Oliver J, Crane J, Williamson DA, Sika-Paotonu D, et al. Understanding group A streptococcal pharyngitis and skin infections as causes of rheumatic fever: Protocol for a prospective disease incidence study. BMC Infect. Dis. 2019, 19, 633. [CrossRef] [PubMed]
37. Chadha A, Jamal W, Aziz AR, Rotimi VO. Overwhelming Streptococcus pyogenes sepsis in an elderly patient with septic arthritis. J. Infect. Public Health 2018, 11, 434–435. [CrossRef]
38. Dakhil BR and Hamim SS. Antibiotic susceptibility of Streptococcus pyogenes and Staphylococcus aureus isolated from Pharyngitis and Tonsillitis patients in Nasiriyah City, Iraq. World J Pharm Sci 2016; 4(4): 14-19.
39. Francis JR, Gargan C, Remenyi B, Ralph AP, Draper A, Holt D, et al. A cluster of acute rheumatic fever cases among Aboriginal Australians in a remote community with high baseline incidence. Aust. N. Z. J. Public Health 2019, 43, 288–293. [CrossRef] [PubMed]
40. Cohen R, Cohen S, Afraimov M, Finn T, Babushkin F, Geller K, et al. Screening asymptomatic households for Streptococcus pyogenes pharyngeal carriage as a part of in-hospital investigation of puerperal sepsis. Am. J. Infect. Control 2019, 47, 1493–1499. [CrossRef]
41. Riad M, Thottacherry E, Crawley C, Phillip-Abraham N, Ibrahim F. Invasive Group A streptococcal postpartum endometritis associated with multi-organ infarctions: An uncommon case presentation and literature review. Postgrad. Med. 2020, 132, 526–531. [CrossRef] [PubMed].
42. Alexander AJ, Myers C, Beres SB, Olsen RJ, Musser JM, Mangino JE. Postpartum group A streptococcus case series: Reach out to infection prevention! Open Forum Infect. Dis. 2018, 5, ofy159. [CrossRef]
43. Seale AC, Davies MR, Anampiu K, Morpeth SC, Nyongesa S, Mwarumba S, et al. Invasive group A streptococcus infection among children, rural Kenya. Emerg. Infect. Dis. 2016, 22, 224. [CrossRef].
44. Bundle N, Bubba L, Coelho J, Kwiatkowska R, Cloke R, King S, et al. Ongoing outbreak of invasive and non-invasive disease due to group A streptococcus (GAS) type emm66 among homeless

and people who inject drugs in England and Wales, January to December 2016. Eurosurveillance 2017, 22, 30446. [CrossRef] [PubMed]
45. Sharma H, Ong M, Ready D, Coelho J, Groves N, Chalker V, et al. Real-time whole genome sequencing to control a Streptococcus pyogenes outbreak at a national orthopaedic hospital. J. Hosp. Infect. 2019, 103, 21–26. [CrossRef] [PubMed].
46. Kobayashi M, Lyman MM, Francois Watkins LK, Toews KA, Bullard L, Radcliffe RA, et al. A cluster of group A streptococcal infections in a skilled nursing facility—the potential role of healthcare worker presenteeism. J. Am. Geriatr. Soc. 2016, 64, e279–e284. [CrossRef] [PubMed]
47. Oliver J, Thielemans E, McMinn A, Baker C, Britton PN, Clark JE, et al. Invasive group A Streptococcus disease in Australian children: 2016 to 2018–a descriptive cohort study. BMC Public Health 2019, 19, 1–10. [CrossRef]
48. Oliver J, Wilmot M, Strachan J, St George S, Lane CR, Ballard SA, et al. Recent trends in invasive group A Streptococcus disease in Victoria. Commun. Dis. Intell. Q. Rep. 2019, 2018, 43. [CrossRef] [PubMed]
49. Ralph AP, Holt DC, Islam S, Osowicki J, Carroll DE, Tong SY, et al. Potential for molecular testing for group A streptococcus to improve diagnosis and management in a high-risk population: A prospective study. In Open Forum Infectious Diseases; Oxford University Press: New York, NY, USA, 2018; p. ofz097.
50. Barth D, Naicker P, Engel K, Muhamed B, Basera W, Mayosi, et al. Molecular epidemiology of noninvasive and invasive group A streptococcal infections in Cape Town. mSphere 2019, 4. [CrossRef]
51. Olp RJ, Chamales IA, Schmiedecke SS. A case study of puerperal Group A Streptococcal infection complicated by toxic shock syndrome. Am. J. Perinatol. Rep. 2020, 10, e1. [CrossRef].
52. Baker MG, Gurney J, Oliver J, Moreland NJ, Williamson DA, Pierse N, et al. Risk factors for acute rheumatic fever: Literature review and protocol for a case-control study in New Zealand. Int. J. Environ. Res. Public Health 2019, 16, 4515. [CrossRef] [PubMed]
53. Mathan JJ, Erkart J, Houlding A. Clinical management and patient persistence with antibiotic course in suspected group A streptococcal pharyngitis for primary prevention of rheumatic fever: The perspective from a New Zealand emergency department. N. Z. Med. J. 2017, 130, 58–68.
54. Centers for Disease Control and Prevention. Group A Streptococcal (GAS) Disease; U.S. Department of Health and Human Services: Atlanta, GE, USA, 2020.
55. Faihan WA and Darweesh MF. The Impact of IL-6 serum level on Tonsillitis and Tonsillectomy Patients infected with Streptococeus pyogenes. Journal of Physics: Conference Scric, 1660(2020) 012019, doi: 10.1088/1742-6596/1660717012019.
57. Sosa MEB. Group A streptococcal infection in pregnancy and the puerperium. J. Perinat. Neonatal Nurs. 2016, 30, 124–130. [CrossRef]
58. International Commission on Microbiological Specifications for Foods. Microorganisms in Foods 5: Characteristics of Microbial Pathogens; Springer Science and Business Media: Berlin/ Heidelberg, Germany, 1996; Volume 5.
59. Okuzono S, Ishimura M, Kanno S, Sonoda M, Kaku N, Motomura Y, et al. Streptococcus pyogenes-Purpura fulminans as an invasive form of group A streptococcal infection. Ann. Clin. Microbiol. Antimicrob. 2018, 17, 31. [CrossRef] [PubMed]
60. Mahida N, Prescott K, Yates C, Spencer F, Weston V, Boswell T. Outbreak of invasive group A streptococcus: Investigations using agar settle plates detect perineal shedding from a healthcare worker. J. Hosp. Infect. 2018, 100, e209–e215. [CrossRef] [PubMed] .
61. Lanitis S, Khan M, Sgourakis G, Kontovounisios C, Papaconstandinou T, Karaliotas C. Severe monobacterial necrotizing soft tissue infection by group A streptococcus: A surgical emergency. Asian Pac. J. Trop. Biomed. 2012, 2, 250–252. [CrossRef]
62. Kawaguchi K, Mori N, Ejima T, Yamada Y, Takahashi T. Streptococcal toxic shock syndrome following group A streptococcal vulvovaginitis in a breastfeeding woman. J. Infect. Chemother. 2019, 25, 1037–1039. [CrossRef] .
63. Al-Aawadi KK Antibiotic Profile and Molecular Characterization of Staphylococcus aureus Isolated from Tonsillitis Patients at Thi-Qar Province. Master thesis. College of Sciences Thi-Qar University, Iraq.2014
64. Rottenstreich A, Benenson S, Levin G, Kleinstern G, Moses A, Amit S. Risk factors, clinical course and outcomes of pregnancy-related group A streptococcal infections: Retrospective 13-year cohort study. Clin. Microbiol. Infect. 2019, 25, 251.e251–251.e254. [CrossRef] [PubMed].
65. Olp RJ, Chamales IA, Schmiedecke SS. A case study of puerperal Group A Streptococcal infection complicated by toxic shock syndrome. Am. J. Perinatol. Rep. 2020, 10, e1. [CrossRef]
66. Tartof SY, Reis JN, Andrade AN, Ramos RT, Reis MG, Riley LW. Factors associated with Group A streptococcus emm type diversification in a large urban setting in Brazil: A cross-sectional study. BMC Infect. Dis. 2010, 10, 327. Available online: http://www.biomedcentral.com/1471-2334/10/327 (accessed on 20 July 2020). [CrossRef]
67. Weiss K, Laverdiere M, Lovgren M, Delorme J, Poirier L, Beliveau C. Group A Streptococcus carriage among close contacts of patients with invasive infections. Am. J. Epidemiol. 1999, 149, 863–868. [CrossRef] [PubMed].
68. Demoré B, Tebano G, Gravoulet J, Wilcke C, Ruspini E, Birgé J, et al. Rapid antigen test use for the management of group A streptococcal pharyngitis in community pharmacies. Eur. J. Clin. Microbiol. Infect. Dis. 2018, 37, 1637–1645. [CrossRef]

69. Rivera-Hernandez T, Rhyme MS, Cork AJ, Jones S, Segui-Perez C, Brunner L, et al. Vaccine-induced Th1-type response protects against invasive group A streptococcus infection in the absence of opsonizing antibodies. mBio 2020, 11. [CrossRef] [PubMed.
70. Block SS. Disinfection, Sterilization, and Preservation, 5th ed.; Lippincott Williams and Wilkins: Philadelphia, PA, USA, 2001; p. 1481
71. Gupta VK, Sekhar S, Dhanda V, Toor D, Kumar R, Chakraborti A. Immune response against M protein-conserved region peptides from prevalent group A streptococcus in a North Indian population. J. Microbiol. Immunol. 2016, 49, 352–358. [CrossRef] [PubMed]
72. Seth A, Kong IG, Lee SH, Yang JY, Lee YS, Kim Y, et al. Modular virus-like particles for sublingual vaccination against group A streptococcus. Vaccine 2016, 34, 6472–6480. [CrossRef].
73. Banigo A, Moinie A, Bleach N, Chand M, Chalker V, Lamagni T. Have reducing tonsillectomy rates in England led to increasing incidence of invasive Group-A Streptococcus infections in children? Clin. Otolaryngol. 2018, 43, 912–919. [CrossRef]
74. Centers for Disease Control and Prevention. Respiratory Hygiene/Cough Etiquette in Healthcare Settings. Available online: https://www.cdc.gov/flu/professionals/infectioncontrol/resphygiene.htm (accessed on 10 February 2020).

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k. Ali M, jawad shaimaa, J. Al-Bayaa Y. A Review article of Streptococcus pyogenes infection: Rick factors, prevention and management strategies. JFacMedBagdad [Internet]. 2023 Apr. 27 [cited 2023 May 15];65(1):79-85. Available from: https://iqjmc.uobaghdad.edu.iq/index.php/19JFacMedBaghdad36/article/view/2041

مقال مراجعة لعدوى العقدية المقيحة: عوامل الخطر واستراتيجيات الوقاية والتدبير

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الخلاصة
الخلفية: العقدية المقيحة المعروفة أيضًا باسم "(GAS)" هي احدى مسببات الأمراض ذات الأهمية الصحية العامة، حيث تصيب 18.1 مليون شخص في جميع أنحاء العالم وتقتل 500000 شخص كل عام.
الهدف: حددت هذه المراجعة المقالات المنشورة حول عوامل الخطر واستراتيجيات الوقاية والسيطرة لأمراض المكورات العقدية.
المواد والأساليب: تم إجراء بحث منهجي لتحديد الأوراق المنشورة على قواعد البيانات الإلكترونية Web of Science و PubMed و Scopus و Google Scholar في محاولة لتوفير معلومات أساسية حول عدوى Streptococcus ، والمخاطر المحتملة لانتشارها ، واستراتيجيات العلاج والوقاية .
النتائج: الطرق الأكثر شيوعًا لانتقال العقديه القيحيه هي من خلال الرذاذ التنفسي ، الآفات الجلدية التي تسببها العقديه القيحيه ملامسة الأشياء أو الأجهزة المصابة. هناك طريقة أخرى محتملة وهي انتقال العدوى عن طريق الغذاء ولكن هناك حاجة إلى مزيد من البحث لتحديد مسار العدوى هذا. تم العثور على المجتمعات الأصلية ، وتلك ذات الوضع الاجتماعي والاقتصادي المنخفض في جميع أنحاء العالم معرضة بشكل خاص لأمراض المكورات العقدية ، وكذلك الأطفال وكبار السن والذين يعانون من ضعف في جهاز المناعة. هذه المجموعات معرضة للإصابة بعدوى العقديه القيحيه ومضاعفاتها مع ارتفاع معدلات العدوى في المؤسسات التعليمية والمستشفيات والازدحام والزيادة المستمرة في الاتصال الاجتماعي. أهمية تحسين الظروف المعيشية والنظافة الشخصية واليدين هي إحدى التقنيات للوقاية من عدوى العقديه القيحيه مع التركيز على طرق مكافحة العدوى بدقة أكبر.
الاستنتاج: يجب أن تستهدف تدابير المنع والمكافحةللعدوى بالعقديه القيحيه مع تحسين الظروف المعيشية والنظافة الشخصية غسل اليدين باستمرار ايضا يجب التأكيد على الالتزام بممارسات الوقاية من العدوى ومكافحتها في الاشخاص الذين يملكون ظروف مريضيه عالية الخطورة .
الكلمات المفتاحية : استراتيجيات الوقاية والعلاج ، الالتهابات, العقدية المقيحة.