

Morbidity and Mortality of Meningococcal Disease in Gaza Governorates, Occupied Palestinian Territory, Ten years Follow up 2005-2014

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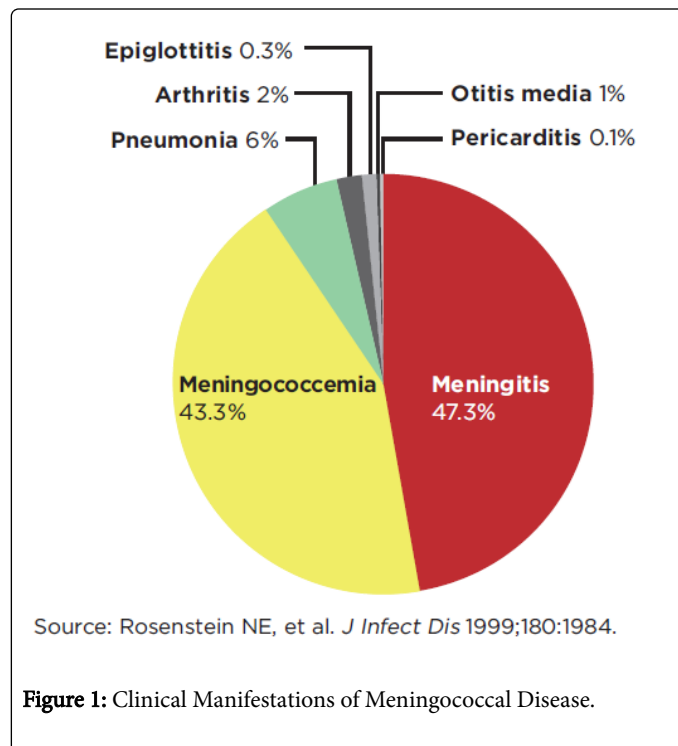
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Background

Meningococcal disease is a serious life-threatening bacterial infection caused by *Neisseria meningitidis* with its most common clinical presentations: meningococcal meningitis (which has high morbidity and low mortality) and meningococemia or Meningococcal septicemia (which has low morbidity and high mortality). Globally, *Neisseria meningitidis* causes meningitis in about 47.3% of cases and Meningococemia in about 43.3% (Figure 1) [1]. The case fatality rate in Meningococcal Meningitis is around 10% and in Meningococemia it may exceed 50%.



Globally, the incidence of endemic meningococcal disease during the last 13 years ranges from 1 to 5 per 100,000 in developed countries where very rare outbreaks can occur, and from 10 to 25 per 100,000 in developing countries mainly in Africa with frequent outbreaks [2].

Neisseria meningitidis causes even epidemics or sporadic cases throughout the world, with seasonal variations. Regular outbreaks of meningococcal disease occur mainly in sub-Saharan African countries within the meningitis belt. The outbreaks could be spread across the world reaching countries in everywhere. The best example was the

outbreak occurred in Mecca in 1987 during the annual Haj, which was spreading globally by pilgrims returning to their home countries [3].

The situation of meningococcal meningitis in the Eastern Mediterranean Region varies considerably from one country to the other. The disease is endemic in many countries including Palestine with its two geographically separated areas (West Bank and Gaza Strip). In West Bank, sporadic cases are reported with an incidence varies from 0.1 to 0.8 per 100,000. But in Gaza Strip (contains 5 governorates: North Gaza, Gaza, Mid-Zone, Khan-Younes and Rafah), the disease is endemic and the incidence varies from 3.9 to 10 per 100,000. Cases in Gaza Strip are mainly reported in northern governorates (Gaza and North Gaza).

Aim of the Study

The study aimed to study the epidemiology of meningococcal infection in Gaza strip during the last ten years in order to improve the outcome of the disease. There are four objectives for this study:

- To determine the magnitude of the problem
- To determine the most affected age group
- To determine geographical distribution of cases
- To determine the case fatality rate among meningococcal meningitis and meningococemia

Methods

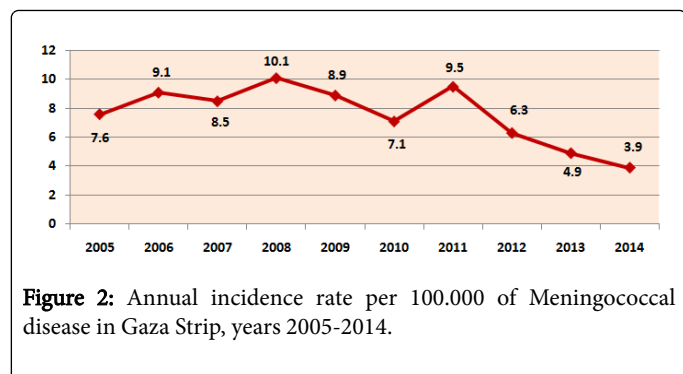
Cross-sectional study carried out involving all confirmed reported cases from 1st January 2005 to 31st December 2014 were studied. Data were collected by administering a questionnaire prepared by Epidemiology department team working in Palestinian Ministry of Health. Data were statistically analyzed using SPSS version 21.

There was a male predominance 56.1%. The mean age of cases was 4.6 years while the median age was 3 years and age distribution showed that it occurred mainly among children five years or less where 75% of cases were reported. Analysis of the clinical course of the meningococcal infection revealed significant prevalence of meningococemia (62.4%). About half of meningococcal disease cases (48%) were diagnosed by skin smear, followed by 23.1% by CSF gram stain, 21.4% by CSF culture. Only 7.5% of cases were diagnosed by blood culture.

Findings

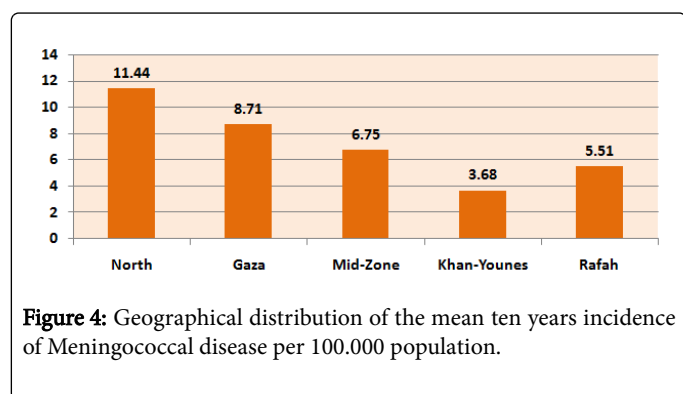
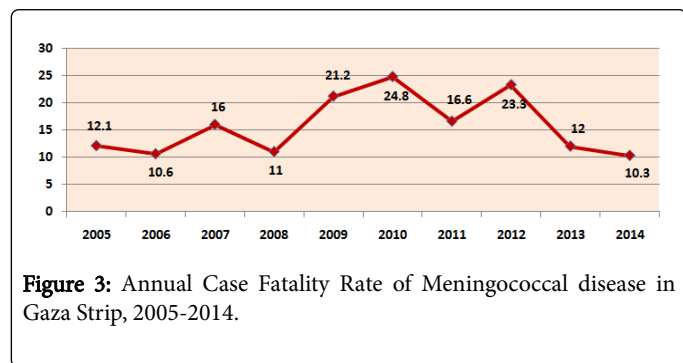
A total of 1134 cases of meningococcal disease were diagnosed in Gaza Strip during the last 10 years. A 10 years review of meningococcal disease in Gaza Strip showed that the overall morbidity

is fluctuating. The incidence rate per 100,000 population ranged from 3.9 in 2014 to 10.1 in 2008 (Figure 2). The mean annual incidence was 7.6 per 100,000 population. A reliable decreased trend was reported since 2008 where the incidence was decreased from 10.1 to 3.9 in 2014.



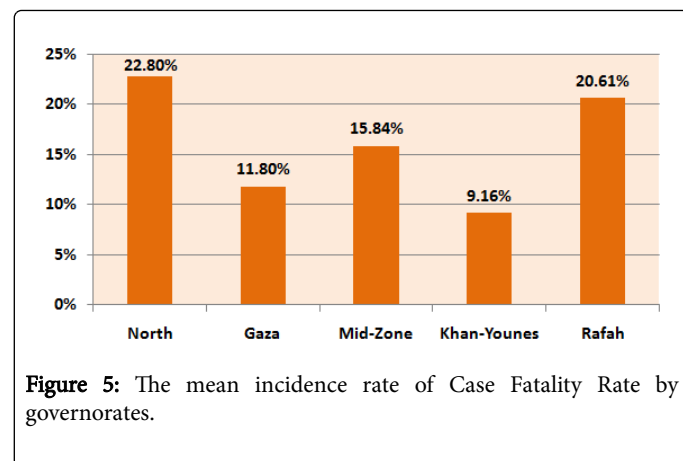
Serogrouping of *Neisseria meningitidis* was performed for 127 (11.2%) cases and all were serogroup B, the serogroup that cannot be protected against (during the time where cases were reported) by the available meningococcal vaccine.

Case-fatality rate (CFR) varied from 24.8% in 2010 to 10.3% in 2014 with an overall CFR of 16% (Figure 3). The majority of deaths (96.7%) were among meningococemia with CFR of 32.8%. Results showed that the majority of deaths (71.4%) were among male.



Epidemiology of meningococcal disease is characterized by marked differences from governorate to governorate (Figure 4). The mean 10 years reported incidence by governorates was 11.44/100000 in North Gaza, 8.71/100000 in Gaza, 6.75/100000 in Mid-Zone, 3.68/100000 in Khan-Younes and 5.51/100000 in Rafah.

The mean 10 years reported CFR by governorates was 22.8% in North Gaza, 11.8% in Gaza, 15.84% in Mid-Zone, 9.16% in Khan-Younes and 20.61% in Rafah (Figure 5). The overall CFR mean was about 16%.



Discussion

According to Gaza situation, the majority of reported cases were diagnosed as meningococemia (62.4%) suggestive that we have an undiagnosed cases of meningococcal meningitis or there were over diagnosis of meningococemia cases. Is it a medical or laboratory problem? as some children used to take empiric treatment (antibiotics) which mimic the picture. As half of cases were diagnosed by skin smear with the absence of a positive blood culture (which consider as probable case of meningococcal meningitis according to the Palestinian case definition), this could increase the incidence of the disease.

Usually, the majority of reported cases were in northern governorates (Gaza and North Gaza governorates). After the outbreak in Rafah governorate in 2012, there was an increase of the incidence in that governorate comparing to northern governorates. The raised question was: Is this a shifting of reported cases from Northern governorates to Southern governorates or merely an accidental finding? According to our follow up of the situation, this increase did not influence the geographical distribution throughout the following years.

During this period in Gaza strip CFR among all cases was about 16.5%; among meningococcal meningitis was less than 1% and among meningococemia was 25.5% (within the world limit), but compared to CFR in developed countries it is still high and improvement is remain a challenge. All deaths (96.8%) were among meningococemia cases. The high incidence of CFR in North Gaza and Rafah governorates could be explained by lack of advanced pediatric medical care compared to other governorates.

Conclusion

Gaza strip still highly endemic with meningococcal disease with high CFR mainly from meningococemia possess a challenge for continuous monitoring of surveillance of meningococcal disease. Meningitis surveillance program in Gaza Strip is strong and has the ability to detect almost all Meningococcal disease cases with a good quality of the reported data in all governorates. Meningococemia is a life-threatening condition whereas meningococcal meningitis is much

less severe. Serogroups B is still the predominant serogroup and responsible for all reported cases in Gaza Strip. *N. meningitidis* is a leading cause of death among infants and children with bacterial meningitis.

Recommendation

The development of a new Meningococcal Group B vaccine against *Neisseria meningitidis* group B represented an enormous progress in the possibility of controlling meningococcal disease caused by serogroups B and offers hope for a more effective prevention strategy

against this disease in Gaza Strip. There is rationale for the use of this vaccine to all infants through the expanded program of immunization.

References

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