

Incidence of Hepatitis 'A' Infection Post Vaccination Program

Khaled M Al-Mosa, MBBS*

Objective: The aim of this study is to assess the incidence of Hepatitis 'A' Virus (HAV) infection after the introduction of vaccination program in 2008.

Setting: Health care settings in Jeddah region, Kingdom of Saudi Arabia.

Design: An ecologic record-based study.

Method: Data on HAV infections were documented from the health registries of the surveillance unit in Jeddah region.

Result: Four hundred sixty-nine HAV infection were documented from 2007 to 2009, the incidence rate revealed a decreasing trend from 4.57 per 100,000 in 2007 to 3.27 per 100,000 in 2009 ($p=0.016$). The decreasing trend was demonstrated among Saudis only ($p=0.007$). The majority of the cases were in the age groups of 5-14 and 15-44 years. No significant difference could be noticed between males and females.

Conclusion: A decreasing trend of HAV infections occurred in Jeddah from 2007 to 2009 among Saudis, which could be partially attributed to the HAV vaccination in 2008. Long-term follow-up is recommended to evaluate the result of vaccination.

Bahrain Med Bull 2011; 33(3):

Hepatitis A virus (HAV) has a worldwide distribution. The prevalence varies from one population to another and is related to socioeconomic factors. In the developing countries, HAV is acquired very early in life and nearly 100% of adults have detectable levels of antibody to HAV (anti-HAV). In such countries, epidemics of HAV are uncommon.

HAV in the developed countries is characterized by a low prevalence among children and a large susceptible pool of adults being negative for anti-HAV. This pattern is associated with high standard of hygiene and sanitation¹.

Most people in hyperendemic areas for HAV acquire the protective anti-HAV antibody through sub-clinical exposure to the virus in their childhood, which provides lifelong immunity against further HAV infection². Lack of such exposure in childhood in low and intermediate endemic areas of HAV might result in a large non-immune population in whom

*Resident

Ministry of Health

Abha, Kingdom of Saudi Arabia

Email: almosakhaled@yahoo.com; drkalmosa@gmail.com

HAV infection has been reported to cause severe adult hepatitis³. The availability of safe and efficacious vaccines against HAV is important to limit the disease spread.

Two decades ago, studies performed in the Kingdom of Saudi Arabia indicated that HAV prevalence rate was 90%-100% amongst the adult population. However, later studies showed a consistent decline in anti-HAV prevalence rate⁴. Therefore, there is a decline trend of HAV infection in KSA; the prevalence rate in children is approaching the prevalence rate for low endemicity, except for some regions like Jizan⁵. Because of high mobility of the Saudi population, the continuing high rates of hepatitis ‘A’ infection in some regions represent a threat to other regions where outbreaks could occur among teenagers and adults with no previous exposure. For this reason, the introduction of hepatitis ‘A’ vaccination for individuals older than 2 years of age needs critical consideration⁶. The vaccination policy against HAV was voluntary in KSA⁷. Recently, the Saudi Ministry of Health introduced HAV vaccine for children 18-24 months old, as part of the EPI program in 2008⁴.

The aim of this study is to assess the incidence of HAV infection in Jeddah region after the introduction of vaccine in the Saudi EPI in 2008.

METHOD

Data on HAV infections recorded in the health registries of the surveillance unit in Jeddah region represent all the cases of HAV infections in the region. The time of study was designed to include the cases one year before and one year after the introduction of HAV vaccination in the EPI of KSA. The design is best suited for evaluation of interventions⁸. Upon approval from pertinent health authorities, the unit registries were reviewed for all cases of HAV from 2007 to 2009. The age group, gender and nationality were recorded.

The incidence rate was calculated per 100,000 for the total population and by nationality, with 95% confidence intervals for each rate. Chi-square test was used to assess the statistical significance. Statistical significance was considered at $p < 0.05$.

RESULT

Four hundred sixty-nine HAV cases were documented during the years of the study. Based on the records of the Surveillance Unit an increase from 143 in 2007 to 219 in 2008 and a decrease to 107 cases in 2009 were observed, see table 1.

Table 1: Incidence Rate of HAV Infections 2007-2009

Year	Population	Cases	Incidence/100,000		X ² for trend
			Rate	95% CI	
2007	3131658	143	4.57	3.86-5.40	5.86 $p=0.016^*$
2008	3200355	219	6.84	5.98-7.83	
2009	3270562	107	3.27	2.69-3.97	

* Statistically significant at $p < 0.05$

Table 2 shows a decreasing trend of incidence rate among Saudis ($p=0.007$). The rate in 2008 was nearly double that of 2007, then decreased to less than half in 2009. The rate among non-Saudis was almost stable and lower than the Saudi rate during the whole study period.

Table 2: Incidence Rate of HAV Infections According to Nationality 2007-2009

Year	Saudi				Non-Saudi			
	Population	Cases	Incidence/100,000		Population	Cases	Incidence/100,000	
			Rate	95% CI			Rate	95% CI
2007	1665653	111	6.66	5.51-8.06	1466005	32	2.18	1.52-3.12
2008	1700632	181	10.64	9.17-12.24	1499723	38	2.53	1.82-3.52
2009	1736345	74	4.26	3.37-5.38	1534217	33	2.15	1.50-3.06
X ² for trend	7.26				0.005			
p-value	0.007*				0.95			

* Statistically significant at $p < 0.05$

Table 3 shows the number of cases of HAV infection during the study period according to age groups. The majority of the cases were in the age groups 5-14, and 15-44 years.

Table 3: Number of Cases of HAV Infection According to Age 2007-2009

Years	Number of cases by age in years										Total	
	<1		1-4		5-14		15-44		> 45			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
2007	13	9.1	14	9.8	67	46.9	43	30.1	6	4.2	143	100.0
2008	0	0.0	24	11.0	125	57.1	65	29.7	5	2.3	219	100.0
2009	0	0.0	5	4.7	44	41.1	46	43.0	12	11.2	107	100.0

Figure 1 illustrates an increase in both genders in 2008 and a decrease in 2009. The increase and decrease were more obvious among females, where the numbers almost doubled in 2008 and dropped to nearly one-third in 2009. The number of cases was lower in females in 2007 and 2009, but higher in 2008.

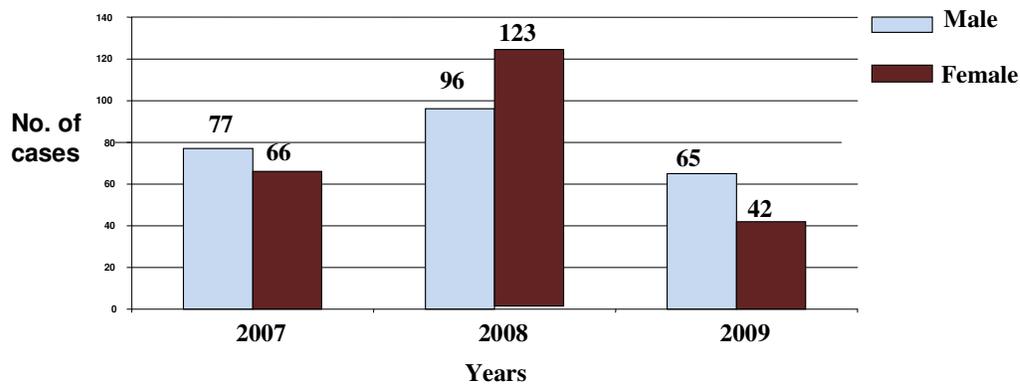


Figure 1: Numbers of HAV Infection According to Gender 2007-2009

DISCUSSION

The study findings show a decreasing trend in the incidence of HAV infections. However, the sharp increase in the year of implementation of the new vaccination policy disturbed this trend; it could be due to heightened awareness.

The overall decreasing trend should not be totally attributed to the new HAV vaccination policy because of the short follow-up period. Nevertheless, the findings cannot deny the positive effect of HAV vaccination which appears to confer long-lasting protection⁹⁻¹¹. The impact of vaccination program will appear after many years of follow-up as in the study of Lopalco et al in Italy who reported that the incidence of hepatitis 'A' decreased from 22.8/100,000 in 1998 to 0.7/100,000 in 2006¹². However, still these authors are uncertain in interpreting these epidemiologic data, whether the current low incidence of hepatitis 'A' is caused by vaccination alone or by with other factors.

In this study, the incidence rate of HAV infections decreased only among Saudis. The rate among non-Saudis was almost stable, and the sharp increase in 2008 was only among Saudis, which may indicate over-reporting of the cases in 2008 secondary to an increased awareness due to vaccination policy. The lower rate among non-Saudis could be attributed to infrequent access to healthcare services compared to Saudis. Moreover, many of these non-Saudis are workers coming from surrounding countries with high endemicity of HAV, which would make the risk of infections lower among them.

In this study, the number of HAV in females was lower in 2007 and 2009, but showed an increase in 2008. Al Rashed found that there was no gender difference, but Jaber found a higher seronegativity in male children compared to females^{7,13}. However, a difference in rate is more dependable than number.

Sex, nationality and socio-economic levels are not taken into account and could not be adjusted due to the lack of such data. However, the finding that the majority of cases were in the age group 5-14 and 15-45 years is similar to Fathalla et al¹⁴. Similarly, a systematic review of all seroprevalence studies conducted in Canada showed an increase with age¹⁵.

CONCLUSION

An overall decreasing trend of HAV infections occurred from 2007 to 2009. This trend is only noticed among Saudis, and may be partially attributed to the new policy of HAV vaccination and its inclusion in the EPI in 2008. Nonetheless, these conclusions should be taken cautiously given the limitations of the study design and the short period of follow-up, in addition to the lack of data on vaccination coverage. A study designed for long follow up is recommended to evaluate the effect of HAV vaccination.

Author Contribution: All authors share equal effort contribution towards (1) substantial contributions to conception and design, acquisition, analysis and interpretation of data; (2) drafting the article and revising it critically for important intellectual content; and (3) final approval of the manuscript version to be published. Yes.

Potential Conflicts of Interest: No

Competing Interest: None **Sponsorship:** None

Submission date: 14 November 2010 **Acceptance date:** 4 July 2011

Ethical approval: The study was approved from the regional health authority.

REFERENCES

1. Yessé ZN, Thérèse KB, Serge OA, et al. Seroprevalence and Risk Factors of Hepatitis A Virus among School Children from Different Socioeconomic Status in Abidjan, Cote D'Ivoire. *J Med Medical Sci* 2010; 1(3): 65-70.
2. Cotton MG, Locarnini SA. Hepatitis A Virus Epidemiology. In: Zuckermann AJ, Thomas HC, eds. *Viral Hepatitis*. London: Churchill Livingstone, 1998: 29-41.
3. Sjogren MH. Hepatitis A. In: Schiff ER, Sorrell MF, Maddery WC, eds. *Schiff's Diseases of the Liver*. 8th ed. Philadelphia: Lippincott-Raven, 1999: 745-56.
4. Al-Faleh F, Al Shehri S, Al Ansari S, et al. Changing Patterns of Hepatitis A Prevalence within the Saudi Population over the Last 18 Years. *World J Gastroenterol* 2008; 14(48): 7371-5.
5. Mohler-Kuo M, Steffen R, Bopp M, et al. Prevalence of Hepatitis A Virus Risk Factors in A Very Low Endemic Country, Switzerland. *Vaccine* 2007; 25(52): 8718-25.
6. Al-Faleh FZ. Changing Pattern of Hepatitis Viral Infection in Saudi Arabia in the Last Two Decades. *Ann Saudi Med* 2003; 23(6): 367-71.
7. Jaber SM. Prevalence of Anti-Hepatitis B and Anti-Hepatitis A Antibodies among School Aged Children in Western, Saudi Arabia. *Saudi Med J* 2006; 27(10): 1515-22.
8. Morgenstern H. Ecologic Studies. In: Rothman KJ, Greenland S, eds. *Modern Epidemiology*. Philadelphia, PA: Lippincott-Raven, 1998: 459-80.
9. Wasley A, Samandari T, Bell BP. Incidence of Hepatitis A in the United States in the Era of Vaccination. *JAMA* 2005; 294(2): 194-201.
10. Lopez E, Debbag R, Coudeville L, et al. The Cost-Effectiveness of Universal Vaccination of Children against Hepatitis A in Argentina: Results of a Dynamic Health Economic Analysis. *J Gastroenterol* 2007; 42: 152-60.
11. Quezada A, Baron-Papillon F, Coudeville L, et al. Universal Vaccination of Children against Hepatitis A in Chile: A Cost-Effectiveness Study. *Rev Panam Salud Publica* 2008; 23: 303-12.
12. Shen YG, Gu XJ, Zhou JH. Protective Effect of Inactivated Hepatitis A Vaccine against the Outbreak of Hepatitis A in an Open Rural Community. *World J Gastroenterol* 2008; 14(17): 2771-5.
13. Lopalco PL, Prato R, Chironna M, et al. Control of Hepatitis A by Universal Vaccination of Adolescents, Puglia, Italy. *Emerg Infect Dis* 2008; 14(3): 526-8.
14. Al-Rashed RS. Prevalence of Hepatitis A Virus among Saudi Arabian Children: A Community-Based Study. *Ann Saudi Med* 1997; 17: 200-3.
15. Fathalla SE, Al-Jama AA, Al-Sheikh IH, et al. Seroprevalence of Hepatitis A Virus Markers in Eastern Saudi Arabia. *Saudi Med J* 2000; 21: 945-9.