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REVIEW ARTICLE

Current Status of Adult Immunisation Amongst Diabetics in India: A Review Article

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Abstract

Vaccinations are recommended throughout life to prevent infectious diseases and their consequences. Adult vaccination is very important as >25% of mortality is due to infectious diseases. The government of India and World Health Organisation (WHO) consider childhood vaccination as the first priority, but there is not yet enough focus on adult immunisation. Vaccines are recommended for adults on the basis of age, prior vaccinations, health conditions, lifestyle, occupation, and travel.[1] Significant efforts are needed to curb morbidity, mortality, and disability among diabetic adults particularly due to influenza, pneumococcal disease,and hepatitis B. India is home to 69.3 million established type 2 diabetics plus another 80 million pre diabetics who are more prone to develop all types of infections. India has a large geriatric pool of diabetics which has substantially increased pneumococcal disease burden. Diabetes mellitus is an independent risk factor for developing invasive pneumococcal disease.[2] There are no data on the burden of lower respiratory infections in India. WHO data from low and middle income countries suggest that lower respiratory tract infections remain the third leading cause of death.[2]

This article will attempt to increase the awareness regarding the importance of vaccination for adult diabetics.

Keywords: ***diabetes, adult immunisation, pneumococcal, influenza vaccination***

Introduction

The growing epidemic of type 2 diabetes mellitus (T2DM) requires interventions to assist diagnosed patients to better manage the disease, to reduce the risk of conversion to frank diabetes from pre-diabetes,and to manage the associated complications. Individuals with diabetes are six times more likely to be hospitalised and three times more likely to die from complications of influenza or pneumonia than those in the general population. Currently, India is home to 69.3 million established diabetics who remain vulnerable to a variety of bacterial and viral infections for the following reasons: hyperglycemia, poor long-term diabetes control, longer duration of diabetes,decreased immunity, impaired lung function, pulmonary microangiopathy, increased risk of aspiration, and coexisting morbidity.[3]

A lot of these ailments are vaccine-preventable. However, the concept of adult immunisation has not favourably evolved amongst physicians treating diabetics in India and relevant data capture has so far been meager and scattered. At Jothydev's Diabetes

Research Center located in Trivandrum, south India, pneumococcal vaccine has been routinely administered to all consenting subjects with diabetes since 2005. Influenza vaccination has also been similarly practiced since 2009 and the centre has by now meticulously preserved electronic data of around twenty thousand patients, successfully vaccinated mostly during their OPD visits.

Immunisation makes a major contribution to global health. At times, two or three doses of vaccination may be required.

Evidence and Discussion

According to the World Health Organisation (WHO), the mortality rate due to pneumococcal infections averages 10–20% while it may exceed to 50% in high risk groups. It is estimated that people with diabetes are almost three times at higher risk of death due to pneumonia-related complications.[4] There is increasing evidence which suggest that diabetes is one of the most common co-morbidities associated with pneumococcal infections.[5,6]

Patients with type 1 diabetes and type 2 diabetes have a 4.4- and 1.2-fold risk of pneumonia-related hospitalisations, respectively. Diabetes subjects with HbA1c ≥9% are at 60% increased risk of pneumonia-related hospitalisation. It is interesting to note that even those with A1c<7% have 22% increased risk in comparison to non-diabetic subjects.[7]

Invasive pneumococcal disease runs high mortality rates in diabetics which necessitates effective preventive strategies including immuno-prophylactic measures. Diabetic patients have a normal response to both influenza and pneumococcal vaccination, and vaccination remains a cost-effective preventive strategy.[8,9]

Annual administration of the influenza vaccine has been shown to decrease diabetes-related hospital admissions for influenza during "flu epidemics" by as much as 79% based on reports of case-controlled series.[10] The Center for Disease Control and Prevention(CDC) reports that older adults are especially vulnerable and vaccinating individuals at high risk before influenza season each year is the most effective measure for reducing the impact of influenza.[11]

According to DIABETES UK position statement issued in October 2014, it is recommended that all people with diabetes, over the age of 6 months, including those who are pregnant, should be offered vaccination against influenza each year regardless of age or type of diabetes management. Pneumococcal polysaccharide vaccine (PPV) is recommended for people with diabetes treated with medication, aged over 2 years.

A recent nested case control study from India conducted among older adults at high risk of developing pneumococcal infection showed that PPV23 provides significant protection with odds ratios of 0.2, 0.25, and 0.33 against recurrent lower respiratory infections, exacerbations of chronic obstructive pulmonary disease (COPD), and hospitalisations, respectively.[12]

Should Every Adult Diabetic Receive Pneumococcal Vaccination?

In the diabetic patients who have other co-morbidities like renal complications, coronary artery disease, COPD, chronic liver disease, malignancies, and pneumococcal vaccination should be recommended on priority by virtue of being at more risk than those with diabetes alone.

Revaccination: A one-time revaccination is recommended by the ADA and ACIP for individuals >64 years of age, previously immunised when they were <65 years of age, if the vaccine was administered >5 years ago.[12.]

The Geriatric Society of India recommends the use of PPV for persons aged 50 years and above and persons aged 2 years or above with certain underlying medical conditions such as diabetes.[12.]

The efficacy and safety of pneumococcal vaccine have been shown in multiple case control studies as ranging from 56% to 81%.[13] In a retrospective study of a large cohort of 47,365 subjects aged 65 years or older, evidences suggest a vaccine effectiveness of 44% against pneumococcal bacteremia and hence its cost effectiveness for this indication.[14]

Pneumococcal vaccine is considered a safe and time-tested vaccine where moderately severe systemic reactions like fever and myalgia are uncommon while severe anaphylactic reactions are extremely rare.[15]

In the 'Community-acquired Pneumonia Immunisation Trial in Adults,' or CAPiTA in short, the effect of vaccine PCV13, (which targets 13 strains of *Streptococcus pneumoniae*) was studied. Over 42,500 senior citizens were administered the PCV13 vaccine from September 2008 to the end of January 2010. The same number of people were given a placebo. The 4-year follow-up focused on whether the subjects were hospitalised with pneumonia or invasive pneumococcal disease.

The authors concluded that among older adults, PCV13 was effective in preventing vaccine-type pneumococcal, bacteremic and nonbacteremic community-acquired pneumonia and vaccine-type invasive pneumococcal disease. The effectiveness of the vaccine did not decrease in the 4 years of the study. Influenza vaccine is recommended for all persons aged ≥6 months who do not have any contra indications to vaccination. Trivalent inactivated influenza vaccine (TIV) can be used for any person aged ≥6 months, including those with high-risk conditions. Evidence that influenza can trigger coronary complications, when taken in the context of diabetic subjects, gains more significance since the risk for CVD is already 2- to 4-fold higher in this sub group.[16] Live, attenuated influenza vaccine (LAIV) [For age group 2–49 yrs] is administered intranasal, whereas TIV is administered intramuscularly.[17]

Influenza vaccination was associated with a 56% reduction in any complication, a 54% reduction in hospitalisations, and 58% reduction in deaths.[18]

Diabetes was independently associated with an increased risk for acute hepatitis B among adults without HBV risk behaviours.[19]

The ACIP Hepatitis Working Group recommends hepatitis B vaccination for all unvaccinated adults with diabetes younger than 60 years as soon as feasible after diagnosis. Hepatitis B vaccination is recommended for all unvaccinated adolescents, all unvaccinated adults at risk for HBV infection, and all adults seeking protection from HBV infection.[20] Hepatitis B vaccination may be administered at the discretion of the treating clinician to unvaccinated adults with diabetes who are aged ≥60 years.[20] Patients with chronic kidney disease including those on hemodialysis should also be vaccinated.[21]

Tdap for tetanus and pertussis should be given to all adults and diabetic children starting at age 2.[22] Zostavax vaccination is recommended for people who have had chicken pox and are 60 years old or older, the recommendation is now being lowered to 50 years old.[23]

New research (Published Online: Wednesday, May 11, 2016 in *Clinical Diabetes*) has uncovered low vaccination rates among patients with diabetes and the researchers found that non adherence to immunisation recommendations runs rampant among patients with diabetes. In India this is further compounded by lack of awareness regarding the convincing benefits of adult immunisation.

In developing countries like India, the concept of adult immunisation is far from reality. Recent H1N1 pandemics have triggered the necessity for considering immunisation in all age groups for the prevention of vaccine-preventable fatal infectious diseases. In our country, providing free vaccines to all adults may not be an economically viable solution, however this hurdle can be partly overcome by providing vaccines at a subsidised rates, with NGOs and philanthropists backing up the immunisation drive.

Suggested recommendations for vaccination in India are as follows:[24]

1. All adult diabetic subjects should be educated about administering pneumococcal and influenza vaccine and those above the age of 60 years should be strongly advised to be vaccinated.
2. Children with diabetes, 2 years of age or older can be given pneumococcal polysaccharide vaccine and children above 6 months of age, influenza vaccine.
3. Other vaccines may be administered in diabetic subjects based on need.

4. Patients with renal failure in any age group can be immunised.
5. People with diabetes and immunocompromised state due to concomitant conditions can be immunised irrespective of their age.
6. Patients with diabetes and chronic lung diseases like chronic obstructive pulmonary disease (COPD), bronchial asthma may be immunised irrespective of their age.
7. People of any age with diabetes who smoke may be immunised.

Conclusion

- Persons with diabetes often have predisposing factors which increase morbidity and mortality from infection. In addition, blood glucose control is more difficult when illness is present.
- Vaccines are among the most cost-effective clinical tools and should be a core component of any preventive services package.
- From the available evidence, the two vaccinations which will be of profound clinical benefit and cost effective in Indian adult diabetes subjects are influenza and pneumococcal vaccines.

References

1. Verma R,Khanna P,Chawla S. Adult immunization in India: importance and recommendations. *Hum Vaccin Immunother*. 2015 Sep;11(9):2180–2.
2. Mohan V, Unnikrishnan R, Thomas N,et al. Pneumococcal infections and immunization in diabetic patients. *J Postgrad Med* 2011; 5778–81.
3. Smith SA, Poland GA. Use of influenza and pneumococcal vaccines in people with diabetes. *Diabetes Care*. 2000; 23:95–108.
4. Akbar DH. Bacterial pneumonia: comparison between diabetics and non-diabetics. *Acta Diabetol*. 2001; 38:77–82.
5. Pneumococcal vaccines [Internet] Available from: http://www.who.int/vaccines/en/pneumococcus.shtml.
6. Kyaw MH, Rose CE, Jr, Fry AM, et al. The influence of chronic illnesses on the incidence of invasive pneumococcal disease in adults. *J Infect Dis*. 2005; 192:377–86.
7. Kornum JB, Thomsen RW, Riis A, et al. Diabetes, glycemic control, and risk of hospitalization with pneumonia: a population-based case-control study. *Diabetes Care*. 2008; 31:1541–5.
8. Joshi N, Caputo GM, Weitekamp MR, Karchmer AW. Infections in patients with diabetes mellitus. *N Engl J Med*. 1999; 341:1906–12.
9. Chen YH, Yang GY, Loh CH, et al. Cost benefits of targeting the pneumococcal vaccination program to the elderly population in Taiwan. *Am J Infect Control*. 2006; 34:597–9.
10. Standards of medical care in diabetes—2015: summary of revisions. *Diabetes Care*. Jan 2015; 38 Suppl: S4.
11. Centers for Disease Control and Prevention (CDC). Prevention and control of seasonal influenza with vaccines. Recommendations of the Advisory Committee on Immunization Practices--United States, 2013-2014. *MMWR Recomm Rep*. 2013 Sep 20; 62(RR-07):1–43.
12. Mohan V, Unnikrishnan R, Thomas, N, et al. Pneumococcal infections and immunization in diabetic patients. *J Postgrad Med* 2011; 57(1):78–81.
13. Shapiro ED. Prevention of pneumococcal infection with vaccines: an evolving story. *JAMA*. 2012; 307:847–9.
14. Jackson LA, Neuzil KM, Yu O, et al. Effectiveness of pneumococcal polysaccharide vaccine in older adults. *N Engl J Med*. 2003; 348:1747–55.
15. Honkanen PO, Keistinen T, Kivelä SL. Reactions following administration of influenza vaccine alone or with pneumococcal vaccine to the elderly. *Arch Intern Med*. 1996; 56:205–8.
16. Warren-Gash C, Smeeth L, Hayward AC. Influenza as a trigger for acute myocardial infarction or death from cardiovascular disease: a systematic review. *Lancet Infect Dis*. 2009; 9:601–10.
17. Centers for Disease Control and Prevention. Prevention and control of influenza with vaccines: Recommendations of the Advisory Committee on Immunization Practices (ACIP), 2011. *Am J Transplant*. 2011.
18. Looijmans-Van den Akker I, Verheij TJ, et al. Clinical effectiveness of first and repeat influenza vaccination in adult and elderly diabetic patients. *Diabetes Care*. 2006; 29:1771–6.
19. Reilly ML, Schillie SF, Smith E, et al. Increased risk of acute hepatitis B among adults with diagnosed diabetes mellitus. *J Diabetes Sci Technol*. 2012 Jul; 6(4): 858–66.
20. Kuehn BM. Immunization recommendations expanded for hepatitis B, HPV, pertussis vaccines. *JAMA*. 2012; 307:1353–4.
21. Recommended Adult Immunization Schedule - United States [Internet] [Cited 2012 Apr 4]. Available from
22. Christenson B, Lundbergh P, Hedlund J, Ortqvist A. Effects of a large-scale intervention with influenza and 23-valent pneumococcal vaccines in adults aged 65 years or older: a prospective study. *Lancet*. 2001; 357:1008–11
23. Kornum JB, Thomsen RW, Riis A, et al. Type 2 diabetes and pneumonia outcomes: A population-based cohort study. *Diabetes Care*. 2007; 30:2251–7.
24. Mohan V, Unnikrishnan R, Thomas N, et al. Pneumococcal infections and immunization in diabetic patients. *J Postgrad Med*. 2011; 57:78–81