



Incidence Data on Diabetes from India

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Knowledge of incidence and prevalence of a disease is vital in Community Medicine to control a disease. It is important in Internal Medicine for clinical diagnosis and presumptive treatment on a probability model. Prevalence informs the total case load at a given time. Incidence yields a pointer to extent of attention required and choice of measures. Incidence of a disease or condition measured over time gives a trend line. It may help to understand causality; e.g., Exposure to asbestos and pleural epithelioma or else, metabolic syndrome and Type 2 Diabetes. It may also measure efficacy of an intervention towards prevention; e.g. Routine Pap smears and Cancer Cervix prevented. It is interesting to observe how the combinations may alter strategy or approach to a disease by magic of numbers as under:

		Incidence	
		High	Low*
Prevalence	High	Dental caries	Type 2 diabetes
	Low	Food poisoning	Thalassemia

* Perhaps transitioning to high

There are two main types of epidemiological studies – cross-sectional and longitudinal.^{1,2} Cross-sectional studies allow us to see a 'snapshot or still photograph' of the number of people with a particular illness at any one point in time. It tells us how widespread the disease is. For example, a cross-sectional study could allow us to count all the people with diabetes (that is, the *prevalence* of diabetes) at any one point in time. Prevalence is calculated as the number of people with the characteristic in question divided by the total population at risk for that characteristic.

On the other hand, a longitudinal study involves at least two time points and allows us to view a 'motion picture' to observe the change occurring in the population during the intervening time. Thus allows us to examine change over time. It also allows us to look at the *incidence* of an illness, which means the number of new cases that develop within a particular period. Incidence tells us about the rate at which a disease is occurring. Incidence is calculated as the number of new cases of an illness or

an endpoint divided by the population initially at risk for developing that illness. Known cases are excluded from the calculation. In the case of diabetes, then, incidence considers the outcomes for the individuals at time point #2 who did not have diabetes at time point #1. Incidence reflect the rate at which healthy people in the population acquire the disease.

Why is an incidence study so important? In a prevalence study, we can only look at factors associated with the outcome in question. For example, we can see that people with diabetes also tend to have abdominal obesity or limited physical activity. However, we can only point to associations between these different variables. In an incidence study where we follow the same individuals over time, we can move beyond association to *causation*. We can see which characteristics at time point #1 caused the outcomes in those same people at time point #2. By looking at this, we can also learn what characteristics have predictive value for the outcome of interest. For e.g. we observe that patients of type 2 diabetes also tend to be obese. This data could indicate any of three possibilities, viz. one, obesity could cause diabetes, two, diabetes could cause obesity and three, the two may be coincidentally found together without their being any causal association. Hence, a prevalence study cannot assert causation; it merely detects associations. Moreover, an incidence study allows us to get a better sense of *all* cases of an illness. In prevalence studies, we miss severe cases that have recently resulted in death. By sampling at two periods, we can learn about the causes of death of people who die between times #1 and #2.

In summary, the strength of an incidence study is that we can examine causation and we can include cases of all severity. An incidence study is often more complicated to do, as it involves keeping track of the respondents over a period of time. This can be very difficult at the community level anywhere, but particularly in a country like India where tracking of individuals is a great challenge. This is why the classic study presented in this issue of JAPI by Mohan et al³ assumes great significance as it is the first incidence study on diabetes and pre-diabetes in India among native Asian Indians. The authors present a long term follow up of the Chennai Urban Population Study (CUPS). The baseline CUPS studies were carried out in 1996-97 and several

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prevalence data on diabetes and metabolic syndrome have been published based on these baseline data. In present study Mohan et al present 8 year follow up data on the CUPS cohort. Among 476 subjects who had normal glucose tolerance at the baseline 13.4% (n=64) developed diabetes and 10.1% (n=48) pre-diabetes, during the follow up period of 8 years. Of the 37 individuals with impaired glucose tolerance at baseline 40.5 % (n=15) developed diabetes during the same period. The overall incidence of diabetes was 20.2 per 1000 person years of follow up while the overall incidence of pre-diabetes was 13.1 per 1000 person years of follow up. These figures appear to be much higher than those published from the west showing once again the well known increased susceptibility of Indians to diabetes.

Survey of literature shows that there is very little data on incidence of diabetes in Asian Indians or indeed even south Asians in general. There is no incidence data on Native Asian Indians. There is a study amongst South African Indians (migrants Asians) with a 10 years follow up by Motala et al.⁴ It is a prospective community study in a South African Indian cohort which was studied (10 years) from Durban showed in 563 subjects a higher incidence. This study had only 22% follow up. Mohan et al's CUPS cohort had a better follow up of 52% and is a systematic landmark study among the Native Asian Indian population.³ Another study where incidence data available is the study by Dowse in the Pacific and Indian Ocean population. This study⁵ reports that the highest incidence rates (above 15 cases/1,000 person years) were observed in the Pima Indians, rural Wanigelas of Papua New Guinea, Nauruans, urban Samoans and Indians in Mauritius. Intermediate rates, between 5-15 cases person years were seen in Creole and Chinese Mauritian, Maltese, Mexican Americans and rural Samoans while the lowest incidence was found in European Americans and Frenchmen, and Papua New Guinea Highlanders. Based on this, Dowse had predicted even as early as 1996, that "continuing modernization and increasing obesity in heavily-populated regions of the Indian sub-continent, Africa and China may produce large epidemics of diabetes".^{5,6} It is of interest that the predictions made by Dowse in 1996, have now come true and India has the largest number of people with diabetes in the world.⁷

This study also presents the risk factors for incident diabetes for the first time in India. Obesity (both generalized and abdominal) and hypertension were predictors of diabetes in this population. However the strongest predictor of incident diabetes was the Indian Diabetes Risk Score (IDRS) developed by Mohan and colleagues and published earlier in JAPI.^{8,9} Thus the usefulness of IDRS to predict diabetes has now been validated by a longitudinal follow up study. Interestingly, IDRS has also been shown to help detect

metabolic syndrome and coronary artery disease in the community.¹⁰

The study is admittedly small and there was only a 52% follow up although due to rapid migration in urban India, this still is a good followup rate. Also, as the data is from the urban area of one state, obviously more data is needed from other parts of India particularly from rural areas where the incidence rates may well differ. Nevertheless, the study is an obvious first step in the direction of providing much needed incidence data from India.

Indeed, the publication of data such as this augurs well for epidemiology in India. While excellent prevalence studies have been published from India, the time has come when India also publishes world class incidence data as well. As India is currently the epicenter of the diabetes epidemic, future projections on the prevalence of diabetes and pre-diabetes are extremely valuable to the Govt. of India which has launched the National Program for control of Diabetes, Cardiovascular Disease and Stroke on Jan 4th 2008.¹¹

It is now possible to use instant study as a model. If cohorts of suitable population are identified and motivated in various cities to begin with, we will understand differences across various geographical areas and ethnic groups. It will be possible to screen the high risks with lesser efforts and better outcome. It will be possible to conduct clinical trials with a high level of credibility of the results. It will be possible to evaluate the impact of different treatment protocols as well as lifestyle changes.

It is hoped larger incidence studies on a nation wide basis will become available soon. More importantly it is hoped that with lifestyle modification the incidence of diabetes can be significantly reduced in India in the future.

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Announcement

Recommendations are invited from members for the following assignments so as to reach Dr. Sandhya Kamath, Hon. General Secretary not later than **25th March, 2008**.

Category No. 1

1. Netaji Oration (2009)
2. Dr. GS Sainani Oration (2009) for API members and
3. Dr. Rabindranath Tagore Oration (2009) - This oration is only for Fellow of Indian College of Physicians (FICP)

Category No. 2

1. Prof. Rathinavelu Subramaniam Endowment Oration (2009)

For the above orations, Persons are selected from the recommendations received from members of the Association/ Fellows of ICP. The recommendations for the above assignments must be accompanied with reasons for recommending a particular person showing the value of his/her research and eight copies each of three of his/her best publications. All relevant papers in connection with the suggestions, such as the bio-data, list of publications etc., should be submitted in 8 sets by the proposer. The recipient of the above oration should deliver a lecture pertaining to his/her work at the Annual Conference in January, 2009.

Category No. 3

Visiting Lectureship for 2008 are

1. Unichem Lectureship in Gastroenterology
2. Dr. Yodh Memorial and Gwalior Conference Training Fellowship
3. Boehringer - Knoll Junior Lectureship in Diabetes
4. Shree Krishnaji Govind and Mrs. Premalabai Bhate Memorial Lectureship in Asthma and Bronchitis
5. Mrs. Jal R Vakil Lectureship in Cardio-Pulmonary Diseases
6. Dr. Shurvir Singh Trust Visiting Professorship

All relevant papers in connection with the suggestions, such as the bio-data, list of publications etc., should be submitted in 8 sets by the proposer.

The selected candidate has to deliver his/her lecture at the institution of his/her choice in the year 2007. The candidate has to get a notification in writing from the Institution that he /she has delivered the lecture.

Those who have received oration/lectureship in a given category are not eligible for application for the other two categories.

The prescribed nomination for for the above orations/lectureship are on the API website "apiindia.org". The relevant document should reach Hon. General Secretary - API, Dr. Sandhya Kamath by **25th March 2008**

All lectureships, orations and awards are open to eminent persons from the discipline of medicine and allied subjects such as Pharmacology, Biochemistry, Pathology and Physiology. The orator in the discipline of medicine should preferably be a member of API.

The members of the Governing Body of API and the members of the Faculty Council of ICP are not eligible to receive any Oration, Lectureship or Award.

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Dr. Sandhya Kamath
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