HISTORY OF DIABETES IN INDIA

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INTRODUCTION

History of diabetes has been written time and again by authors across the world. Yet, it is amazing to read these accounts from different authors who had their own perceptions, updations and judgments of history as they penned centuries of events, landmarks and breakthroughs in diabetology. This chapter is one of the rare attempts which deals exclusively with history of diabetes as far as Indian scenario is concerned. It illustrates unfolding of many events that have been relegated to the era of forgotten past of antiquity, medieval era, dark ages and the 19th to 20th century thereafter including India's immediate post independence period. This being 100th year after the epoch making discovery of insulin in 1921, a special mention on insulin usage in India during yesteryears has been included. This chapter is dedicated to the fathers and forefathers of diabetes for their contributions to Indian diabetology.

VEDIC PERIOD TO 8TH CENTURY AD (Diabetes: a disease since antiquity)

It is believed that in India, even Vedic period which is any time between the year 3000 BC to 600 BC had known about diabetes through its ancient Indian scriptures. Gleaning the pages of recorded works of antiquity, one comes across references to conditions characterized by polyuria, most of which doubtlessly answers the description of diabetes mellitus (1). Hindus of ancient India had recognized "honey urine" much before the western world realized the sweet taste of urine almost ten centuries later. In the Christian era, Indian physicians like Charak and Susruta from early centuries of the Common Era and Vagbhata from the 7th century authored comprehensive ayurvedic treatises named Charak Samhita, Susruta Samhita and Astangahrdaya in Sanskrit language respectively and contributed to the knowledge of prameha and madhumeha, the two interchangeable terms for diabetes (2). While giving reference to this condition, Charak said that sweetness of the body be discovered by approach of flies and emmets (Figure 1) and Susruta even mentioned lean and obese type of Madhumeha patients (Figure 2). Gosavi and Ramekar refer to preventive and management approach of diabetes based on information contained in Vagbhata's Astangahrdaya (3) (Figure 3). This treatise of Vagbhata also points out that the patient of Madhumeha passes urine resembling madhu (honey) and there is sweetness in everything in the body (may be whole inter and intracellular fluids).

Figure 1: Charak: Indian Father of Medicine 400-500 AD

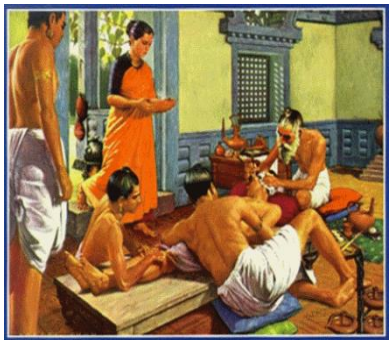

Figure 2: Susruta-2 types of Diabetes 400 -500 AD

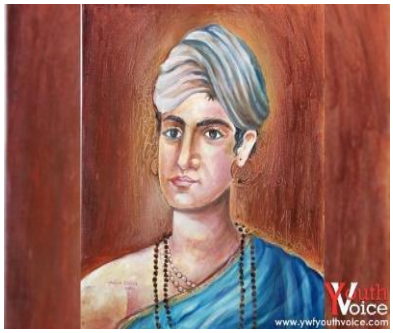

Figure 3: Vegbhata-The ancient Indian writer 7th century AD

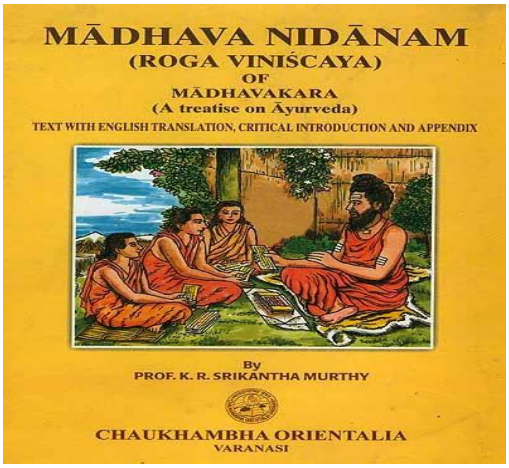

Figure 4: Madhavakara-Early 8th century gave excellent picture of diabetes in his treatise

Madhavakara of early 8th century A.D. also furnished an excellent picture of this condition in Madhava Nidanam (Figure 4) which is acclaimed as a standard work on pathology in ancient India. Madhavakara considered excessive rest and sleep and ingestion of excess curd and jaggery as diabetogenic factors while Kautilya had mentioned much earlier (321-296 BC) that soot obtained from burning chemalion and lizardand honey were all diabetogenic (1).

9TH CENTURY AD TO 16TH CENTURY AD (Medieval period and dark ages)

Like elsewhere in the world, not much happened in India in the field of diabetology during the medieval period. In a way, dark ages for any progress on diabetes in India continued even beyond this period for some more time before and after the British came, when India was ruled first by British through East India Company of Britain from 1757 for 100 years followed by direct rule during the British Raj till India became independent in 1947.

FROM THE 19TH CENTURY (Diabetes in pre-independence India)

Main center of diabetes related activities from the 19th Century appeared to be Calcutta that was also the capital of India at that time. Despite rampant infectious diseases and relatively insignificant disease like diabetes in those times, many reports began pointing towards increasing prevalence of diabetes particularly among the upper middle and rich class. Although as early as 1867, KN Acherjee reported only 2 cases of diabetes among wealthy subjects (4), upper and middle calass persons increasingly falling prey to diabetes and its serious consequences attracted noticeable attention. KC Bose however noted that women were especially less prone to developing diabetes (5). A vivid account from Arnold, a history professor from Warwick University in the United Kingdom provides opinions and reports from several Indian doctors and British doctors working in India and to name some, they were KC Bose (Figure 5), CL Bose (Figure 6), KP Gupta, A Mitra, BC Sen and EE Waters from Calcutta and TM Nair from Madras and few others (6). But he missed out on the contributions of JP Bose (Figure 7) who was first to start a Diabetes Clinic in early 1900s and was also the first to start treating young diabetics with the life-saving newly discovered insulin in the year 1924 itself (7). Being from Allen & Harris and British Drug House from the UK, insulin preparation used here was called AB Insulin.

Figure 5:Koilas Chander Bose OBE

Figure 6: Chunni Lal Bose

Figure 7: Jyoti Prakash Bose

Several observations on diabetes were made during the 19th and 20th centuries. Both acute and chronic forms of diabetes comparable to present day type 1 and type 2 diabetes were described (5, 8, 9). An Indian surgeon, Gupta delivering a paper on diabetes before the Calcutta Medical Society in 1881 stressed on increasing prevalence of diabetes and that it remained rare among the lower classes of Bengal (10). Class was again emphasized when in his 1917 monograph, Waters, the civil surgeon at Howrah, observed that diabetes in Bengal was a disease of the educated class and rarely occurred among the labor class (11). CL Bose remarked 'What gout is to the nobility of England, diabetes is to the aristocracy of India (12).

Gupta related the disease not only to rich diet and lack of physical exercise but also to stress and worries (10). Others blamed diabetes as due to lack of outdoor exercise, starchy diets, stress of modern urban living and peculiarly enough even due to insanitation, early marriage and sexual excess etc. (8, 9, 13). More specifically, Sen in 1893 opined that absence of fish, milk and dal from a diet which consisted mainly of rice caused dyspepsia and was contributing to diabetes (8).

Arnold eloquently captured the prevailing Indian thought that diabetes in India had a distinctive socio-cultural context of its own. He narrated the attempts that were made by doctors to politicize, tropicalize and even racialize the disorder of diabetes and mold international opinion towards this distinctiveness (6). Political discourse engaged colonial medical establishment which was not inclined to give much importance to diabetes in the face of life threatening malaria, plague, influenza and small pox on one hand and Indian medical profession which was drawing government's attention to increasing prevalence and death due to diabetes among the upper class and the rich on the other hand. It was no wonder therefore that only two noteworthy monographs on diabetes in India were available before the first world war (9, 11). With regard to tropicalizing of diabetes, British Medical Conference in 1907 probably marked the first stage by devoting a session on diabetes in tropics. Diabetes thereafter, was increasingly claimed to be tropical both by scale (diabetes was much more common in Indians than foreigners) as well as by its association with unique Indian dietary practices and tropical climate. Tulloch on his East African experience, even showed the exceptional pan-tropical distribution of diabetes and forwarded the argument that diabetes was a disease of largely uneducated and 'tribal' tropical races struggling with the challenge of modern urban civilization (14). Tropical concept then continued to flourish as evident from five successive World Congresses on Diabetes in Tropics and Developing Countries held between 1966 and 1993, three of which were held in Bombay.

Concept of racialization of diabetes began not so much because of primary racial differences but more because of dietary differences accounting for varying rates of diabetes among different races (12, 15, 16). It was revealed by these investigators that diabetes was much more common among Indians vs. Europeans, Indian Hindus vs. Indian Non-Hindus and rice eating Indians vs. non-rice eating Indians and these were thought to be related to different food habits in different races and ethnicities. Mitra analysed 200 diabetic cases in 1895 and observed Hindus, Muslims, Europeans and others constituting 65%, 22% ,7% and 6% proportions respectively (15).

Finally, despite epoch making insulin discovery in the West, indigenous treatments in the form of countless plants and herbals like jambul seeds from Ayurvedic medical system and opium (codeine) from Unani Medical system were emphasized in tune with India's special socio-cultural context. These remedies were

already in vogue before the discovery of insulin but there are no historical records available as to the origin of these numerous plants and herbals. That India was yet fully aware of miraculous effects of insulin is evident from the detailed account of various properties and usefulness of insulin for diabetic patients from JP Bose (17). His wok illustrates pictures of several diabetic children who were almost facing certain death due to diabetes but showed dramatic recovery when treated with insulin (18). Interestingly, Bose also pointed out to the possibility of aggravation of hyperglycaemia and diabetes by prolonged use of insulin because this would decrease insulin production from islet cells and cause disuse atrophy of pancreas (19).

DIABETES IN INDEPENDENT INDIA (The first three decades: 1947-1977)

Period since 1947 when India became independent reflects the era when the country transformed itself from a state of deprivation (life expectancy only 32 years) to a resonating society. Separating the first three decades from the recent decades makes sense because the former is relatively unknown to current generation and for whom, events of these first three decades may well have gone into oblivion. Also, it is hard to imagine for this generation that today's entities like HbA1c, metabolic syndrome, DPP4s, newer insulins etc., were insignificant or even non-existent in the 60s and 70s. Saliently, post independence India witnessed increasing frequency of poor people also falling prey to diabetes, enhanced political sensitivity to this disease and demolition of the concept of racialization but a continuing reinforcement of the concept of tropicalization of this disorder. Main events that unfolded during these early three decades are highlighted in the succeeding paragraphs.

(i) Diabetic clinics, organizations and diabetologists

Calcutta's early initiatives in diabetology gradually extended to Bombay and Madras that too became centres of diabetes related activities, both opening their first diabetic clinic in 1948 in western and southern part of the country respectively (20, 21). Such clinics began multiplying in other Indian cities like Delhi and other tier one cities. Diabetic patients were however not so common but yet the immediate concerns were managing them and educating the public at large about the disorder with research occupying only the back seat. Diabetic Association of India was founded in 1955 which after some years established All India Institute of Diabetes at Mumbai (20). M V hospital for Diabetes was set up around 1971-72 as a private organization in Madras (21). Many doctors of the time made contributions to Indian diabetology and to name a few, they are MK Chhetri from Calcutta, RV Sathe, SS Ajgaonkar, JC Patel, CV Talwalkar, NG Talwarkar, BS Raheja, RD Kulkarni, HB Chandelia, SD Mehtalia and S Sadikot from Bombay, M Viswanathan, SGP Moses, CV Krishnaswami, U Mohammad and V Seshiah from Madras, H Vaishnava, MMS Ahuja, Lt.Gen.RS Hoon (RSSDI President for 1976), NPS Verma, JS Bajaj, Vinod Kumar, M Bhaskar Rao and MC Srivastava from Delhi, OP Gupta from Ahmedabad, BB Tripathy, BC Kar and NC Panda from Cuttack, KN Pai, PJ GeeVerghese and M Ramachandran from Trivandrum and BK Sahay, GS Mutalik, DK Hazra, BN Srivastava, C Munichoodappa and MC Nath from various other Indian cities.

Research Society for the Study of Diabetes in India (RSSDI) was established in Delhi in December, 1972. Man Mohan Singh Ahuja and like minded diabetologists like OP Gupta, BB Tripathy, M Vishwanathan, SGP Moses and Vinod Kumar as founding members steered and guided the affairs of RSSDI during the initial years

Figure 8: RSSDI Asia Book of Records:

Shining bright, RSSDI showcased its countless activities in last 50 years including the latest, 100 million persons' glucose testing in 100 days and 1 million on a single day in the year 2021, registering this event (Defeat Diabetes Campaign) in the Asia Book of records (Figure 8).

(ii) Ushering the era of research

Only clinical and epidemiological research was pursued during early years. Unusual forms of diabetes like pancreatic diabetes, "J" type diabetics (and malnutrition related diabetes mellitus) and ketosis resistant young diabetics frequently reported from Trivandrum (22), Cuttack (23) and Delhi (24) respectively caught world's attention. Although many of these varieties have virtually disappeared but experimental diabetology, the twin sister of clinical diabetology was started mainly to unravel the pathogenesis of these unusual forms of diabetes reported from India. As insulin and other hormone measurement kits were not available, cumbersome bioassays based on animal experimentation and radioimmunoassays were set up. To understand metabolic abnormalities of diabetes, clinical diabetologists including Ahuja, professor of medicine at Delhi, took upon themselves to revamp their laboratories, perform diabetes related biochemical tests, maintain animal house facilities, carry out the procedures like raising insulin antibodies in the animals and perform isotopic labelling in their own laboratories with support from basic scientists where ever available. In keeping with global trends in diabetes research, role of bioassay based total, suppressible and non-suppressible insulin like activities (TILA, SILA and NSILA) in the pathogenesis of diabetes was investigated (25). Some of these however, were later regarded as mere artifacts. Resultingly, a large number of observations on pathogenesis of different clinical types of diabetes became available (26). Sundry clinical reports on aetiopathogenesis, diagnostic criteria, complications and treatment of diabetes kept appearing in literature (27). Importance of glycemic variability was recognized rather crudely as it meant the avoidance of only gross hypo and hyperglycemia and isolated attempt to employ Schlichtkrull's M-Value for ensuring a smoother diabetic control was made (28).

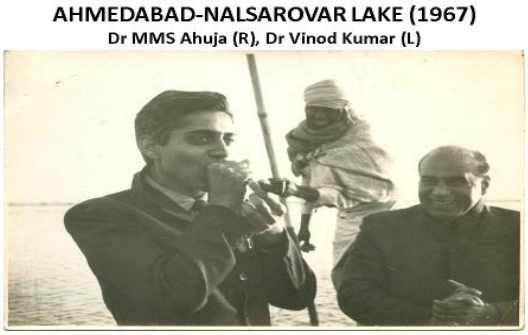

Figure 9:MMS Founder, VK Founder Secretary

Figure 10:O P Gupta President RSSDI 1972-73

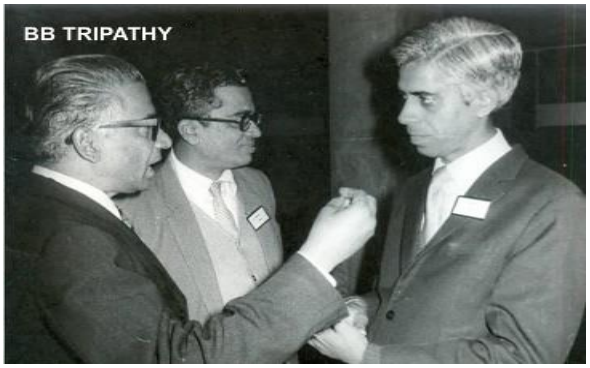

Figure 11: BB Tripathy, President RSSDI 1974

Figure 12: M Vishwanathan, President RSSDI 1977-78

(iii) Unfolding the Indian Diabetology before International community

Few Indian scientists had first hand personal opportunity to witness global progress in diabetology during the 50s and 60s. Yet, a sizeable number of Indians would participate in World Congresses whenever these were held in India or in its neighborhood. Tropicalization of diabetes was a popular subject in these meetings as is evident from 5 successive World Congresses on Diabetes in Tropics and Developing Countries held

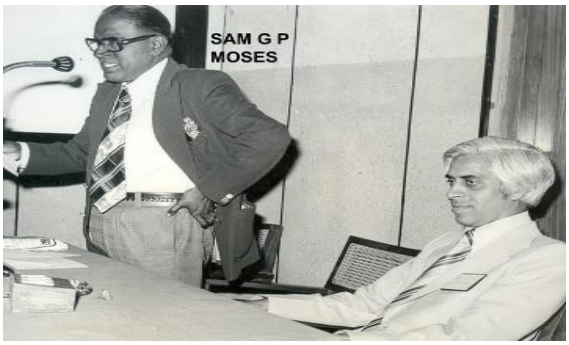

Figure 13: SGP Moses, President RSSDI 1975

from 1966 to 1993. Three of these Congresses were held in Bombay in 1966, 1981, 1993 and one each was held at Bangkok in 1984 and at Dhaka in 1987 (29-33).

Through a welcome commitment of interest by the non-communicable section of WHO, Geneva, in 1974, Harry Keen, discoverer of microalbuminuria invited participants from 14 centers across the world including one from New Delhi to a preparatory planning and training meeting in London on Epidemiology of Diabetes and its Vascular Complications (34).

The first RSSDI Monograph, a 1974 book on Disorders of Carbohydrate Metabolism with contributions from Indian and foreign scientists was reviewed in 1976 in some length by Dr. Max Ellenberg, Immediate Past President of American Diabetes Association and the co-author of a 1962 Diabetes Book authored jointly with Harold Rifkin (35, 36).

SS Ajgaonkar from Bombay and JS Bajaj were the two Honorary Presidents of International Diabetes Federation (IDF) while JS Bajaj had the distinction of being the first Asian to be elected to the high

post of President of IDF for 1985 to 1988. The only one so far, International Diabetes Federation Congress (IXth) was organized in Delhi in 1976 where a large number of eminent diabetologists from all over the globe descended to this event. Bombay, through the aegis of Diabetic Association of India and All india institute of Diabetes had its own share of welcoming many of these eminent persons to showcase their respective countries' epidemiological data at a WHO sponsored Satellite Meeting of IDF on Epidemiology of Diabetes and its Vascular Complications held at Bombay. Proceedings of this meeting were edited by Harry Keen J C Pickup of CSII fame and C V Talwalkar (37). Dr. SS Ajgaonkar's Welcome address was an occasion to introduce Indian Diabetologists to Internationals.

Figure 14: JS Bajaj
President IDF 1985-88

In 1975, American diabetologist, Kelly West, father of diabetes epidemiology, published responses of 20 international and American participants including one from India on the question of diagnostic criteria of diabetes and published the same in the Americal journal, Diabetes. Its extract says "A survey of twenty diabetologists revealed that they employ diagnostic criteria differing quite substantially. In some populations, including the general population of the United States, these disparities would result in very major differences in the rates of "diabetes." Under certain common circumstances, some diabetologists would classify as normal more than half of the one and two-hour values considered to be abnormal by other well qualified diabetologists" (38).

Indian diabetologists continue to report in the international and national literature, additional forms of diabetes like low weight type 2 diabetes (39), Asian Indian phenotype, the thin fat Indian diabetic (40) and new and unique clusters of type 2 diabetes with important implications for disease progression and management (41) and thereby reinforce diabetes as an emblematic disorder of evolving heterogeneity.

Summary

Thanks to the diligent and brilliant minds, ancient and modern events in diabetology are testament to the fact that India was never a late starter. While we have our own share of significant diabetes related events in India, we, like anywhere else in the world have also witnessed the rise and fall of many research ideas over the past such as "J-type and malnutrition related diabetes", usefulness of high carbohydrate diet in diabetes", "angiopathies being unrelated to control and duration of diabetes", "usefulness of bioassay based TILA, SILA and NSILA in the pathogenesis of diabetes, "Schlichtkrull's M-value as a measure of glycemic variability" and "earstwhile treatment with Dirty insulins, 1st generation sulphonureas and the biguanide, phenformin". While eradication of malnourished "J" type of diabetes in young people from our country over the years is like a landmark in slow motion, Defeat Diabetes Campaign undertaken by Research Society for the Study of Diabetes in India (RSSDI), the largest organization of doctors for diabetes in Asia is an unmatched feat of current times that will go down in the history in golden letters.

I leave it to some other day and some other person to narrate the history of recent decades, once they begin to be forgotten and also to trace the history of RSSDI which is going to complete half a century next year in 1922.

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