

Incidence of insulin-dependent diabetes mellitus in Jordanian children aged 0–14 y during 1992–1996

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Ajlouni K, Qusous Y, Khawaldeh AK, Jaddou H, Batiehah A, Ammari F, Zaheri M, Mashal A. Incidence of insulin-dependent diabetes mellitus in Jordanian children aged 0–14 y during 1992–1996. *Acta Pædiatr* 1999; Suppl 427: 11–3. Stockholm. ISSN 0803–5326

An attempt was made by the Jordanian National Center for Diabetes, Endocrine and Genetic Diseases (NCDEGD) to identify all cases of type 1 diabetes among Jordanian children aged 0–14 y. Data were obtained retrospectively for the years 1992–1994 and prospectively for the years 1995 and 1996, including full name, national identifying number, date of birth, date of diagnosis and family history. The incidence was calculated as the number of cases per 100 000 population, according to the national census of 1994. The incidence rate for these years (1992 through 1996) was 2.8, 2.9, 3.2, 3.6 and 3.6 per 100 000 population, respectively. The male:female ratio was (1:1.03). Seasonal variation at clinical onset was noticed, with maximum incidence in the winter months and minimum incidence in the summer months. In conclusion, the incidence of type 1 diabetes mellitus in Jordanian children aged 0–14 y is among the lowest in the region, but is rising. □ *Children, incidence, insulin-dependent diabetes mellitus, Jordan, type 1 diabetes*

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There is growing interest in the epidemiology of type 1 diabetes, as manifested by the number of international study groups, such as Diabetes Epidemiology Research International (DERI) (1, 2), Eurodiab Aetiology of Childhood Diabetes on an Epidemiological Basis (ACE) (3) and the World Health Organization's Diabète Mondial (WHO DIAMOND) (4). Previously, it was thought that diabetes mellitus was a disease of wealthy or more developed countries, but recent studies have shown that it is also a disease of developing countries (5). Several reports have shown an increase in the prevalence of diabetes in developing countries as they adopt western lifestyles (6) and in migrants from developing to developed countries (7, 8). Data on the incidence of type 1 diabetes in developing countries (9–13) support an increasing trend in the incidence of type 1 diabetes mellitus (10–12). Although there are few studies reported on the epidemiology of insulin-dependent diabetes (IDDM) in Arab countries (8–13) there have been no previous reports from Jordan.

Country background

In Jordan, healthcare services are provided by five sectors. The Ministry of Health (MOH) cares for all government employees, those on social aid and the dependants of these groups (40% of the population).

The Royal Medical Services (RMS) provides care for the army, police, security and their dependants (38% of the population). The Universities Health System (UHS) takes care of all university students, university employees and their dependants (8% of the population). United Nations Relief and Work Agency (UNRWA) for Palestinian Refugees and the private sector take care of the rest of the population (16%). In early 1995 the National Center for Diabetes, Endocrinology and Genetic diseases (NCDEGD) was established with the objective of unifying efforts to study the incidence, aetiology, prevention and treatment of these diseases in Jordan.

Data collection

The identification of cases of IDDM was among the priorities of the NCDEGD. Early in 1995, a campaign was launched by NCDEGD to identify cases of IDDM using mass media (newspapers, television and radio). A form appeared in local newspapers with a request for patients or their guardians to complete. Similar forms were distributed to all hospitals and paediatric clinics in the country and to public and private schools. Data collected included national identity numbers (which are unique for every citizen), full names, dates of birth, dates of first insulin injection and history of diabetes

Table 1. Incidence of type 1 diabetes mellitus in Jordan 1992–1996 (cases per 100 000 per year among children 0–14 y of age) by year of diagnosis and sex.

Year of diagnosis	Population	Cases	Males	Females	Incidence
1996	1 845 958	66	34	32	3.6
1995	1 774 960	64	34	30	3.6
1994	1 703 962	55	28	27	3.2
1993	1 635 864	47	22	25	2.9
1992	1 570 372	43	22	21	2.8

mellitus in first- and second-degree relatives. Following this campaign, reports of newly diagnosed cases in all hospitals, and paediatric clinics were collected on a monthly basis by an endocrinologist. The data for the present study were prospective for the years 1995 and 1996 and retrospective for the years 1992–1994. To verify the completeness of ascertainment, we obtained data from the supply departments of the MOH, RMS, and UHS including national identity numbers, names and dates of first order of insulin. These constituted the secondary data source, which was checked against the primary data source, described above, using the capture-recapture method. The degree of ascertainment was 95%. The population data were obtained from the Jordanian National Bureau of Statistics based on the 1994 census with extrapolation for other years. Incidence was calculated as the number of newly diagnosed subjects per 100 000 persons for the different age and sex groups.

Results

A total of 275 new cases of IDDM were identified among children aged 0–14 y, during the study period 1992–1996. The distribution of cases by year of diagnosis (first insulin injection) is presented in Table 1. The incidence varied from 2.8/100 000 in 1992 to 3.6/100 000 in 1996, with no difference between males and females.

Table 2 shows the average annual age-specific incidence, with the highest incidence (5.5/100 000) among children 10–14 y of age and the lowest (1.3/100 000) among children < 4 y of age. Seasonal variation was noticed, with maximum incidence in the winter months and minimum incidence in the summer months.

Discussion

The present study constitutes the first report on type 1 diabetes from Jordan. There is a wide variation in the incidence of IDDM among populations (6–14), with the highest being in Finland (15) and Sardinia (16) and the lowest being in the Far East (17). In addition, there is a general increase in the incidence of type 1 diabetes in many European (18–21) and Middle Eastern countries.

Table 2. Age-specific and sex-specific incidence rates (cases per 100 000 per year) of type 1 diabetes among children aged 0–14 year, Jordan 1992–1996.

Age (y)	Diabetics	Incidence	Males	Females
0–4	39	1.3	19	20
5–9	90	3.2	47	43
10–14	146	5.5	74	72
Total	275	3.2	140	135

Data from Israel (8), Sudan (9), Libya (11), Oman (12) and Kuwait (13) show an increasing pattern of IDDM. A similar pattern is present in Jordan. Our data show an increase in the incidence of IDDM between 1992 and 1996, which could be due to environmental factors, better registration or, alternatively, may be a chance finding. The incidence of IDDM among Jordanian children was close to that among Israeli Arabs (8), but much lower than among Israeli Jews (Ashkenazi, non-Ashkenazi and Yemenite) (8).

The high incidence of IDDM observed among Yemenite Jews settled in Israel and the four-fold increase in Kuwait (13) in the past decade are alarming and difficult to explain on genetic basis alone. These changes support the important role of social and environmental factors in IDDM. Rapid economic growth, industrialization, the associated nutritional habits and the adoption of western lifestyles may explain these recent trends in IDDM.

In accordance with the majority of published literature, the incidence rate in our study increased with age, with no significant differences between male and female children. The seasonal variation at diagnosis is also similar (22), with more diagnoses in the winter and fewer in the summer months.

In conclusion, the incidence of IDDM in Jordan is still low, but is increasing.

Acknowledgments.—The authors acknowledge the assistance of Drs A. Kheir, A. Madanat and all the physicians working in the healthcare centres of the MOH. This research was supported by grants from the universities of Jordan, Yarmouk, Science and Technology, Al-Albyat, Motah, Hashemiah, WHO and the Higher Council for Science and Technology in Jordan.

References

1. LaPorte RE, Tajima N, Akerblom HK, Berlin N, Brosseau J, Christy M, Drash AL, et al. Geographic differences in the risk of insulin-dependent diabetes mellitus: the importance of registries. *Diabetes Care* 1985; 8 Suppl 1: 101–7
2. Diabetes Epidemiology Research International Group: geographic patterns of childhood insulin-dependent diabetes mellitus. *Diabetes* 1988; 37: 1113–9
3. Green A, Gale EAM, Patterson GC, for the Eurodiab ACE Study Group: incidence of childhood-onset insulin-dependent diabetes mellitus: the Eurodiab ACE study. *Lancet* 1992; 339: 905–9
4. WHO DIAMOND Project: WHO multinational project for childhood diabetes. *Diabetes Care* 1990; 13: 1062–8

5. Karvonen M, Tuomilehto J, Libman I, LaPorte R, for the WHO DIAMOND Project Group: a review of the recent epidemiological data on the worldwide incidence of type 1 (insulin dependent) diabetes mellitus. *Diabetologia* 1993; 36: 883-92
6. LaPorte RE, Matsushima M, Chang YF. Prevalence and incidence of insulin-dependent diabetes. In: *Diabetes in America*, 2nd edn. Harris MI, Cowie CC, Stern MP, Boyko EJ, Reiber GE, Bennett PH, editors. Washington, DC, National Institutes of Health (NIH publ. no. 95-1468), 1995; 37-46
7. Siemiatycki J, Colle E, Campbell S, Dewar R, Aubert D, Belmonte MM. Incidence of IDDM in Montreal by ethnic group and by social class and comparisons with ethnic group living elsewhere. *Diabetes*, 1988; 37 (8): 1096-102
8. Shamis I, Gordon O, Albag Y, Goldsand G, Laron Z. Ethnic differences in the incidence of childhood IDDM in Israel (1965-1993). Marked increase since 1985, especially in Yemenite Jews. *Diabetes Care* 1997; 20 (4): 504-8
9. Elamin A, Omer MI, Zein K, Tuveno T. Epidemiology of childhood type 1 diabetes in Sudan, 1987-1990. *Diabetes Care* 1992; 15 (11): 1556-9
10. Salman H, Abanamy A, Ghassan B, Khalil M. Childhood diabetes in Saudi Arabia. *Diabet Med* 1991; 8 (2): 176-8
11. Kadiki OA, Reddy MR, Marzouk AA. Incidence of insulin-dependent diabetes (IDDM) and non-insulin-dependent diabetes (NIDDM) (0-34 years at onset) in Benghazi, Libya. *Diabetes Res Clin Pract* 1996; 32 (3): 165-73
12. Soliman AT, al-Salmi IS, Asfour MG. Epidemiology of childhood insulin-dependent diabetes mellitus in the Sultanate of Oman. *Diabet Med* 1996; 13 (6): 582-6
13. Shaltout AA, Qabazard MA, Abdella NA, LaPorte RE, al Arouj M, Ben Nekhi A, Moussa MA, al Khawari MA. High incidence of childhood onset IDDM in Kuwait. *Diabetes Care* 1995; 18 (7): 923-7
14. Dahlquist G. Epidemiologic studies of childhood insulin dependent diabetes. *Acta Paediatr Scand* 1991; 80: 583-9
15. Tuomilehto J, Lounamaa R, Tuomilehto-Wolf E, Reunanen A, Virtala E, Kaprio EA, Akerblom HK. Epidemiology of childhood diabetes mellitus in Finland: background of a nationwide study of increasing trend in type 1 (insulin-dependent) diabetes mellitus. *Diabetologia* 1992; 35: 70-6
16. Songini M, Loche M, Muntoni SA, Stabilini M, Coppola A, Dessi G, Green A, Bottazzo GF, Muntoni SE. Increasing prevalence of juvenile onset type 1 (insulin-dependent diabetes mellitus) in Sardinia: the military service approach. *Diabetologia* 1993; 36: 547-52
17. Ko KW, Yang SW, Cho NM. The incidence of IDDM in Seoul from 1985-1988. *Diabetes Care* 1994; 17: 1473-5
18. Joner G, Sovik O. Increasing incidence of diabetes mellitus in Norwegian children 0-14 years of age 1973-1982. *Diabetologia* 1989; 32: 79-83
19. Bartsocas CS, Dakou-Voutetakis C, Damiannaki D, Karagianni C, Kassiou C, Qadreh A, et al., (for the EURODIAB ACE G1 Group). Epidemiology of childhood IDDM in Athens: trends in incidence for the years 1989-1995. *Diabetologia* 1998; 41: 245-8
20. Bingley PJ, Gale EAM. Rising incidence of IDDM in Europe. *Diabetes Care* 1989; 23: 289-95
21. Schober E, Schneider U, Qalldhor T, Tuomilehto J. The Austrian Diabetes Incidence Study Group: increasing incidence of IDDM in Austrian children: a nationwide study 1979-93. *Diabetes Care* 1995; 18: 1280-3
22. Nystrom L, Dahlquist G, Rewers M, Wall S. The Swedish Childhood Diabetes Study: an analysis of the temporal variation in diabetes incidence 1978-1987. *Int J Epidemiol* 1990; 19: 141-6