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Iranian Osteoporosis Research Network: Background, Mission and Its Role in Osteoporosis Management

HR Aghaei Meybodi [1], R Heshmat [1], Z Maasoumi [1], A Soltani[1], A Hossein-nezhad [1], AA Keshtkar [2], A Bahrami[3], R Rajabian [4], I Nabipour [5], GH Omrani [6], M Pajouhi[1], *B Larijani [1]

[1]Endocrinology & Metabolism Research Center, Tehran University of Medical Sciences, Tehran, Iran
[2]Golestan University of Medical Sciences, Gorgan, Iran
[3]Dept. of Internal medicine, Tabriz University of Medical Sciences, Tabriz, Iran
[4]Dept. of Internal medicine, Mashhad University of Medical Sciences, Mashhad, Iran
[5]Dept. of Internal medicine, Boushehr University of Medical Sciences, Boushehr, Iran
[6]Dept. of Internal medicine, Shiraz University of Medical Sciences, Shiraz, Iran

Abstract

Because of increase in elderly population, osteoporosis appears to become as a major public health issue in developing countries as in Iran. In order to obtain a clearer picture of osteoporosis in Iran, studies on different aspect of osteoporosis especially national projects about epidemiology and burden of disease, are required. Coordinating research programs is possible only by establishing a research network, so the national osteoporosis research network was suggested by Endocrinology and Metabolism Research of Tehran University of Medical Sciences. Iranian Osteoporosis Research Network (IORN) was established in 2002 by approval of Deputy for Research and the National Advisory Committee on Non-communicable Diseases of Ministry of Health and Medical Education of Iran. At first, five centers of Medical Sciences Universities and Research Centers in addition to the EMRC, participated in this project. Gradually more centers joined to the network and the numbers of IORN members are now 41 persons from 21 universities and research centers. IORN has had several activities: 1) Research projects, from among them are Iranian Multi-center Osteoporosis Study (IMOS) and Hip Fracture Registry Project (HFRP) in Iran 2) Educational activities with the aim of preventing osteoporosis and its related fractures 3) Establishment of osteoporosis clinic. In summery osteoporosis is an important public health issue especially in developing countries because of increasing in elderly population. Close relationship between academic and research centers through the IORN membership provided possibility of designing and applying national research projects on epidemiology and burden of osteoporosis.

Keywords: *Public health, Osteoporosis, Fracture, National Network, Iran*

Introduction

Osteoporosis is "a skeletal disorder characterized by compromised bone strength predisposing to an increase risk of fracture" (1). It is a common condition, especially among elderly women, and is a major risk factor for fractures, which occur most commonly at wrist, spine and hip. It is also cause people to become bedridden with serious complications. Worldwide approximately 200 million women have osteoporosis (2).

It caused about 9 million fractures in the year 2000 (3), and it is expected to increase this number by more than three-fold over the next 50 yr as a result of the aging population (4).

It has been estimated that more than 840 million people over the age of 60 will live in developing countries by the year 2025 representing 70% of all older people worldwide (5). Because of increase in elderly population, osteoporosis appears to become as a major public health issue in developing countries as in Iran. There is paucity of epidemiological data on osteoporosis in developing countries. There are few studies on prevalence and incidence of osteoporosis in these populations. Bone density and fracture risk is varies between races, Therefore population specific normative data for bone density are required (6).

Osteoporosis is associated with high morbidity and mortality especially because of its expression in age related fractures. The mortality rate of the hip and spine fractures is about 20 % (7).

***Corresponding author:** Tel: +98 21 88220037-8, Fax: +98 21 882220054, E-mail: emrc@tums.ac.ir

The total disability-adjusted life years (DALYs) lost due to osteoporotic fractures was 5.8 million in the year 2000, somewhat more than accounted for by hypertension and rheumatoid arthritis. The burden was greater in women than men with estimated 64% of DALYs for women (3). In a study on burden of osteoporosis in Iran in 2001, total years of life lost due to osteoporotic fractures were found to be 32375 years for hip fractures and 3493 and 158 yr for vertebral and forearm fractures respectively. Collectively osteoporosis was found to be responsible for 36027 yr of life lost due to premature mortality and disability (8).

To maintain health, quality of life and avoid dependency in elderly population, prevention of this disease and thus its associated fractures is considered essential. Of recommendations to prevent osteoporosis is adequate intake of calcium and vitamin D. Vitamin D deficiency is a widespread problem as it is common in the Middle East (6), therefore evaluation of Vitamin D status in Iranian population is needed to plan population based preventive programs.

Studies on economic aspect of osteoporosis and its influence on quality of life in developing countries are required (6). Fractures impose a major economic burden on health care systems worldwide. For example in some western countries, the cost of treating one hip fracture alone during the first year is estimated to be about US $20,000 (9). Understanding burden of osteoporosis and its related fractures will inform health care system about importance of osteoporosis as a public health problem and will promote to design and apply preventive strategies all over the country.

Background and structure

In order to obtain a clearer picture of osteoporosis in Iran, studies on different aspect of osteoporosis especially national projects about epidemiology and burden of disease, are required. Research without systematic planning wastes time and money. Coordinating research programs is possible only by establishing a research network, so the national osteoporosis research network was suggested by Endocrinology and Metabolism Research Center (EMRC) of Tehran University of Medical Sciences (TUMS).

Iranian Osteoporosis Research Network (IORN) was established in 2002 by approval of Deputy for Research and the National Advisory Committee on Noncommunicable Diseases of Ministry of Health and Medical Education (MOHME) of Iran. This research network was designed by cooperation between the EMRC and other academic and research centers that collaborate in studies on osteoporosis throughout Iran. At first, 5 centers of Medical Sciences Universities and Research Centers in addition to the EMRC, participated in this project. Gradually more centers joined to the network and the numbers of IORN members are now 41 persons from 21 universities and research centers (The IORN members are listed in appendix 1). The network was established to make information and experience exchange and to save resources by avoiding repetitive investigations and designing common research projects.

The EMRC as IORN secretary facilitates relation between the network members and communication with international advisors and Ministry of Health. Furthermore, meetings among members are held regularly twice a year, to present the results of researches and to propose new idea about different aspects of osteoporosis in Iran.

Communications

The EMRC is the only WHO collaborating center for research and education on management of osteoporosis among EMRO (Eastern Mediterranean Regional Office) members.

This research center is a member of International Osteoporosis Foundation (IOF) that is one of the most authoritative international organizations dedicated to prevention, diagnosis and treatment of osteoporosis.

Relationship between the EMRC and MOHME facilitates conduction of national project about

osteoporosis in Iran. Results of these researches are reported to Ministry of Health. Studies on osteoporosis epidemiology and disease burden, which are the major research priority of IORN, will influence on healthcare system planning to improve Iranian population health.

Goals

The main objective of the IORN is to design a general plan for research on osteoporosis in Islamic Republic of Iran, and then to support and coordinate local and national research projects all over the country and to identify and overcome barriers to conduct investigations.

Detailed objectives

- To identify important research questions and determine investigation topic priority about osteoporosis in Iran.
- To design research protocols and support and monitor their conduct.
- To train health care professionals by sequential workshops and congresses.
- To establish osteoporosis clinics all over the country with educational, preventional and therapeutical aims.
- To achieve preventive measures to reduce osteoporosis and its complication in Iranian population by public education, food fortification, screening and treatment of osteoporosis.

Research Projects

1. Iranian Multi-center Osteoporosis Study (IMOS)

Iranian Multi-center Osteoporosis Study (IMOS) was executed (2000-2004) by Endocrine and Metabolism Research Center (EMRC) in collaboration with the Ministry of Health, and 5 Medical Universities (Tehran, Mashhad, Shiraz, Tabriz, and Boushehr). The second phase of IMOS has been initiated in two cities (Sari & Yazd) since January 2005.

The main objectives of this study were to determine standardized prevalence of osteoporosis and osteopenia and the age of peak bone mass in Iranian population. Identifying prevalence of serum vitamin D deficiency and relationship between nutrition and other life style factors and osteoporosis in Iran were the other aims of the study.

Material and Methods

We recruited 5339 healthy men and women who were 20-70 yr old from citizens of five cities of Iran (Tehran, Mashhad, Shiraz, Tabriz, and Boushehr) based on random cluster sampling. Iran is a large country therefore; we selected these cities to cover people of different races and geographical zones (Fig. 1). We excluded individuals with history of rheumatoid arthritis, type 1 diabetes mellitus, thyroid, parathyroid, adrenal, renal and cardiac diseases as well as who had a history of infertility, oligomenorrhea, malignancy, malnutrition, physical inactivity, pregnancy, breast feeding, alcoholism, cigarette smoking and also who were taking drugs affecting bone metabolism.

Fig. 1: Cities that collaborated in IMOS

A written informed consent was taken from each participant. The study was approved by Ethic Committees of Tehran University of Medical Sciences and Ministry of Health.

One fasting blood sample was taken from each participant in his/her place of residence, in winter. Samples centrifuged and serum extraction was done in the field. Then samples were frozen immediately and were sent to the EMRC

laboratory for analysis. Biochemistry markers such as calcium, phosphorous, alkaline phosphatase, creatinine, total protein and albumin were measured. 25-hydroxy vitamin D (25-OH-D) level was measured with radioimmunoassay (RIA) method (Biosource Europes.A,Ò). Normal range for serum vitamin D (25-OH-D) was 23-113 nmol/l. Serum PTH measurement was done using immunoradiometric assay (IRMA) method (Diasorin, Ò) and normal range for PTH was considered 13-45 nmol/l.

We evaluated bone mineral density at two sites (lumbar & hip), using Dual X-ray Absorptiometery technique (DXA) by Lunar DPX device (Lunar 7164, GE, Madison, WI). To evaluate bone Mineral density at heel area, we applied Clascan (Demetek-Sewden) device and for quantitative ultrasound of fingers, DBM-Sonic device was employed.

The subjects were asked to complete a questionnaire at the time of bone mineral density analysis, which is, included details of physical activity, duration of sun exposure, diet, drug history, past medical history, etc. Height and weight were measured at this stage.

All of the questionnaires and reports of bone densitometry from each city were sent to the EMRC and data interpretation and analysis was done in this center.

Several manuscripts were prepared and published using data of this national study (10-20).

2. Hip Fracture Registry Project (HFRP) in Iran

Because of related disability, diminished quality of life and mortality, hip fractures is a major public health concerns. Hip fractures accounted for 0.82 million and 1.53 million DALYs in men and women respectively (3). The worldwide prevalence of disability from hip fractures only, has been projected to be about 2.6 million people by 2025, and deaths following hip fracture have been projected to be about 700,000 deaths a year by the year 2025 (21,22) .

According to WHO recommendation, health service data are required in many countries on length of hospital stay, morbidity, mortality and institutionalization associated with osteoporotic fractures together with associated costs, so that osteoporosis can be placed in an adequate health care prospective (4). Epidemiology of hip fractures related to osteoporosis in each country, provides basic information to measure burden of the disease and plan preventive strategies. In order to calibrate FRAX (Fracture Risk Assessment tool) algorithm for more countries, WHO point out to the fact that more data is needed about epidemiology of fractures (4).

Then, the valid national data regarding incidence and prevalence of osteoporotic fractures are essential for health policy making and health planning in the area.

The aim of this national project is determining the prevalence of hip fractures related to osteoporosis in Iranian population and measuring the total expenditure that is imposed on health care system. Finally, the data of this study will provide basic information for designing a national hip fracture registry system in the future in Iran.

Details

This project had two phases, retrospective and prospective. In retrospective phase, in two years interval (2005-2007) all cases of hip fractures that were admitted in hospitals with orthopedic, trauma or emergency facilities were included in the study. All Hospital records of hip fractures based on ICD-10 including femoral neck or femoral head fracture (S72.0 code), intertrochanteric fracture (S72.1), subtrocantheric fracture (S72.2), acetabulum fracture (S32.4), Osteoporotic fracture (M81.4) and all from minor trauma, is registered by educated research assistants in a structured questionnaire. The information that is extracted from records includes patient's demographic data, past medical and surgical history, status of their current fracture and costs of hospitalization. Then, the patients will be called and asked about outcome of their fracture and probable disability.

The HFRS has been done as pilot in Golestan Province. This research project has been done in some centers of IORN and will be started in others in near future with a common protocol.

Educational Programs

The IORN follows educational strategies with the aim of preventing osteoporosis and its related fractures and consequently decrease in disability and mortality because of osteoporosis in Iran. These strategies include public education, patient education and professional education.

• Public Education

To raise general population knowledge about osteoporosis, its risk factors and preventive measures, the IORN have the following programs:

- Holding several meetings about osteoporosis for different aged group people especially who are at risk.
- Preparation of educational posters in occasion of world osteoporosis day to inform general population, their skeletal health.
- Relationship with Islamic Republic of Iran Broadcasting (IRIB) to produce programs regarding osteoporosis in order to notify general population of osteoporosis importance owing to it is an asymptomatic disorder since fracture occurs. These programs educate people on who are at risk for osteoporosis and need to refer for screening, and life style changes required to prevent osteoporosis and its related fractures.

• Patient Education

The IORN Distributed brochures, pamphlets, and booklets among patients in hospitals, osteoporosis clinics and health care centers that are about osteoporosis risk factors, preventive ways including suitable nutrition and physical activity, screening, diagnosis and treatment of osteoporosis.

• Professional Education

Sequential congresses and workshops have been held and will be held to inform general physicians and specialists of new about osteoporosis management and promote researchers to investigate about osteoporosis challenges in Iran. **"Osteoporosis diagnostic course with densitometry certification"** was the last seminar that was held by EMRC with IOF provision and in cooperation with Ministry of Health & Medical Education and WHO, in March 2008.

A clinical practice guideline entitled **"prevention, diagnosis and treatment of osteoporosis"** has been compiled with cooperation of network members and distributed among them to promote best practices about osteoporosis.

Osteoporosis Clinic

Osteoporosis is an asymptomatic disease until a fracture occurs. But bone mineral density and other risk factors can be used to identify high risk patients. Effective treatments have been developed that reduce the risk for osteoporotic fractures; therefore there is an increasing need to assess patients at risk, to allow for prevention and timely intervention. Accordingly a special clinic for osteoporosis management was established as a pilot in Shariati hospital (An educational hospital of the Tehran University of Medical Sciences) since 7 yr ago. Screening, patient treatment, follow up and education are being done every day in this clinic. We plan to establish such a clinic in other cities of our network in the future.

Conclusion

Osteoporosis is an important public health issue especially in developing countries as a result of increasing in elderly population. There is absence of information about osteoporosis epidemiology and disease burden in Iran. Therefore it seemed essential to establish a national osteoporosis research network to plan and support research projects regarding osteoporosis challenges in Iran.

The IORN main objective is advancement in osteoporosis management in Iranian population by applying investigation's results in practice to reduce prevalence of osteoporosis and its related morbidity and mortality through its association with fragility fractures.

Two-sided relationship between academic and research centers through the IORN membership provided possibility of designing and applying national research projects on epidemiology and burden of osteoporosis. Results of these studies will report to Ministry of Health of Iran and surely will influence on healthcare programs in future.

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