INTERNATIONAL JOURNAL
OF
PHARMACEUTICAL SCIENCES
AND
RESEARCH

TREATMENT AND DIAGNOSTIC PATTERN OF OSTEOPOROSIS IN BANGLADESH

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ABSTRACT: Osteoporosis is defined as low bone density with micro architectural deterioration of bone tissue leading to enhanced bone fragility and increased fracture risk. Knowing the treatment pattern of osteoporosis is imperative in achieving better health outcomes. Thus the purpose of our study was to assess the treatment pattern of osteoporosis in 8 different medical colleges and hospitals in Bangladesh situated in 2 different districts, Dhaka and Comilla between the periods of September 2015 to April 2016. A pre-designed questionnaire was given to 107 doctors in the hospitals and data was collected on sociodemographic and professional characteristics of the participating physicians along with their learning opportunities and different parameters of treatment and diagnosis. Majority of doctors, 89.7% had internet access at work place for getting updated on osteoporosis, 84.1% attended specialized osteoporosis programs but only 63.6% had subscription in medical journal or website, Around 58.9% practitioners used guidelines for osteoporosis and a greater percentage of doctors, 15.1% preferred bisphosphonates for treatment of osteoporosis. Preferred diagnostic tool was dual-energy X-ray absorptiometry among the majority study population, around 25.4%. Gaps in knowledge of practitioners must be identified and measures must be taken accordingly for a better infrastructure of healthcare system in Bangladesh.

INTRODUCTION: Osteoporosis is defined as a chronic, progressive but silent disorder featured by bone deterioration, decreased bone mass and bone strength [1, 2]. The National Institutes of Health consensus defined osteoporosis as "a skeletal disorder characterized by compromised bone strength, predisposing a person to an increased risk of fracture. Bone strength reflects the integration of two main features: bone density and bone quality" [2]. Osteoporosis can be classified as either primary or secondary.

In primary osteoporosis, bone loss occurs in both males and females due to the aging process. In this type of osteoporosis, bone resorption pits are filled incompletely, but the activation rate of skeletal bone remodeling units remains normal.

Different types of medications, nutritional deficiencies and chronic medical conditions are associated with the bone loss in secondary osteoporosis [3]. Globally osteoporosis is identified as an increasing public health problem [4, 5]. An estimated value showed that in 1990, worldwide around 1.7 million people suffered from osteoporotic hip fracture and the total number is assumed to increase to 6.3 million by 2050 [6]. Researches claimed that both economic and psychological impact of hip fracture consequences will increase globally, especially in Asia [7].

QUICK RESPONSE CODE

It has been observed that misdiagnosis and under treatment is quite common for some chronic disease like osteoporosis which could result in a long course, cross-diagnosis, inadequate knowledge about the disease and lack of warning signs prior to fracture [8]. Physicians play an important role for implementing preventive measures, early detection and management of this type of chronic disease. In any health care system, disease screening, risk factor identification and follow-up of the patient's condition can be applied easily by the process of general practice [9].

MATERIALS AND METHODS: This cross-sectional descriptive study was carried out at 8 different hospitals and medical colleges of Bangladesh situated in 2 different districts between the periods of September 2015 to April 2016. The government hospitals and medical colleges include Dhaka Medical College, Sir Salimullah Medical College and Comilla Medical College. The private hospitals and medical colleges were United Hospital, Eastern Medical College and Hospital, Moon Hospital, Health and Doctors and CD path hospital.

The survey was performed on 107 doctors who were treating osteoporosis. Both male and female doctors were included in the study and given predesigned questionnaire. The questionnaire did not contain any questions which could reveal the identity of the participants. In addition to treatment pattern, we collected socio-demographic data that include gender, age, year of experience, professional grade.

Data was analyzed using Microsoft Excel 2007.

RESULTS: Among 107 participants 58 (54.2%) were males. A large number of them around 71% had (1 - 10) years of experience and a few around 2.8% had experience within 21 - 30 years. Majority of the study population about 74 (69.2%) were specialists. Most of the target population 35 (32.7%) were specialized in medicine, 22 (20.6%) were gynecologists and a small number of population were from neuro medicine and neuro surgery around, 7(6.5%) and 5 (4.7%) respectively **Table 1**.

Of the 107 participants about 90 (84.1%) attended specialized osteoporosis programme.

TABLE 1: SOCIO-DEMOGRAPHIC AND PROFESSIONAL CHARACTERISTICS OF THE PARTICIPATING PHYSICIANS

Variable	N (%)
Sex	
Male	58 (54.2%)
Female	49 (46.8%)
Age	
26-35 years	54 (50.5%)
36-45 year	45 (42.1%)
> 45 year	8 (7.5%)
Years of Experience	
1- 10 years	76 (71.0%)
11- 20 years	28 (26.2%)
21- 30 years	3 (2.8%)
Professional Qualification	
Medicine	35 (32.7%)
Neuro Medicine	7 (6.5%)
Neuro surgeon	5 (4.7%)
Orthopedic	18 (16.8%)
Orthopedic Surgeon	20 (71.0%)
Gynecologist	22 (20.6%)
Professional grade	
Specialist	74 (69.2%)
Consultant	10 (9.3%)
No response	23 (21.5%)

For the treatment purpose, around 63 (58.9%) participants used guidelines. About 96 (89.7%) doctors had internet access at work and around 68 (63.6%) had subscription in medical journal / website **Table 2**.

TABLE 2: DIFFERENT OPPORTUNITIES OF THE PARTICIPATING PHYSICIANS

Variable	N (%)
Specialized Osteoporosis program attendance	90 (84.1%)
Having Internet access at work	96 (89.7%)
Using Guideline for treating OP	63 (58.9%)
Having subscription in medical journal / website	68 (63.6%)

During patient counseling, 41.3% participants conferred about the sign of osteoporosis, bone pain, 20.9% about kyphosis and 20.0% about loss of height. They also counselled about the uncontrollable risk factors like age (13.1%), menopause (13.3%), female gender (12.7%); controllable risk factors like smoking (10.8%), poor nutrition (10.3%), Vitamin D deficiency (10.3%), insufficient exercise (10.0%); complications of osteoporosis such as bone fracture (55.38%), slouched body posture (38.17%) **Table 3**.

TABLE 3: COUNSELING PATIENTS REGARDING OSTEOPOROSIS

Variable	N (%)
Signs and symptoms:	
Bone pain	97 (41.3%)
Kyphosis	49 (20.9%)
Loss of height	47 (20.0%)
Fatigue	34 (14.5%)
Other	8 (3.4%)
Uncontrollable risk factors:	
Age	97 (13.1%)
Family history of osteoporosis	58 (7.8%)
Low body weight/being small and thin	33 (4.4%)
Menopause	99 (13.3%)
Hysterectomy	41 (5.5%)
Rheumatoid arthritis	41 (5.5%)
Female gender	94 (12.7%)
Previous fracture	44 (5.9%)
Ethnicity	44 (5.9%)
Estrogen deficiency	75 (10.1%)
Long term glucocorticoid therapy	82 (11.1%)
Primary/secondary hypogonadism in men	34 (4.6%)
Controllable risk factors:	
Higher intake of Alcohol	76 (9.0%)
Poor nutrition	87 (10.3%)
Higher intake of caffeine	56 (6.7%)
Avoidance of sunlight	48 (5.7%)
Higher intake of cola beverages	52 (6.2%)
Vitamin D deficiency	87 (10.3%)
Smoking (Direct)	91 (10.8%)
Smoking (Passive)	36 (4.3%)
Low body mass index	31 (3.7%)
Lack of protein intake	25 (3.0%)
Eating disorder	55 (6.6%)
Insufficient exercise	67 (10.0%)
Low dietary calcium intake	71 (8.5%)
Low salt diet	17 (2.0%)
Frequent falls	41 (4.9%)
Disorders that affect the skeleton:	
Asthma	63 (12.0%)
Nutritional/gastrointestinal problems (*e.g.* Crohn's or celiac disease)	62 (11.8%)
Rheumatoid arthritis	74 (14.1%)
Haematological disorders/malignancy	40 (7.6%)
Some inherited disorders	44 (8.4%)
Hypogonadal states (*e.g.* Turner syndrome / Kleinfelter syndrome, amenorrhea)	89 (17.0%)
Endocrine disorders (*e.g.* Cushing's syndrome, hyperparathyroidism, diabetes)	80 (15.2%)
Immobility	73 (13.9%)
Medical treatments affecting bone health	
Glucocorticosteroids	106 (18.2%)
Certain immunosuppressant (calmodulin / calcineurine phosphatase inhibitors)	69 (11.8%)
Thyroid hormone treatment (L-Thyroxine)	48 (8.2%)
Certain steroid hormones (medroxyprogesterone acetate, luteinizing hormone releasing hormone agonists)	59 (10.1%)
Aromatase inhibitors	22 (3.8%)
Certain antipsychotics	16 (2.7%)
Antacids	19 (3.2%)
Certain anticonvulsants	25 (4.3%)
Previous fracture	57 (9.8%)
Certain antiepileptic drugs	17 (3.0%)
Lithium	43 (7.4%)
Methotrexate	63 (10.8%)
Proton pump inhibitors	39 (6.7%)
Complications of osteoporosis	
Bone fracture	103 (55.38%)
Slouched body posture/ Kyphosis	71 (38.17%)
Other	12 (6.45%)

Majority of the study population 104 (50.0%) used bone mineral density test, around 63 (30.3%) used serum calcium and 32 (15.4%) used serum creatinine test for evaluation of osteoporosis **Table 4**.

TABLE 4: CLINICAL EVALUATION FOR OSTEOPOROSIS

Variable	N (%)
Bone mineral density test	104 (50.0%)
Serum calcium	63 (30.3%)
Serum creatinine	32 (15.4%)
Other	9 (4.3%)

Preferred diagnostic test among the participants were Dual-energy x-ray absorptiometry (DXA), around 25.4%. Plain radiography, X-ray and Qualitative CT scan imaging were also preferred by the doctors about 23.1%, 18% and 17.4% respectively **Table 5**.

TABLE 5: PREFERRED DIAGNOSTIC PROCESS FOR BMD

Diagnostic Tool	N (%)
Dual-energy x-ray absorptiometry (DXA)	89 (25.4%)
Plain radiography	81 (23.1%)
Qualitative CT scan imaging	61 (17.4%)
Quantitative ultrasound densitometry (QUS)	19 (5.4%)
MRI	36 (10.3%)
X-ray	63 (18.0%)
Other	1 (0.3%)

Around 70.0% participants preferred plain radiography because of its usefulness in fracture prediction. Qualitative CT scan imaging was preferred by 51.5% study population because of its sensitivity.

TABLE 6: REASONS FOR PREFERRING SPECIFIC DIAGNOSTIC TOOL

	N (%)
Plain radiography	
Useful for fracture prediction	98 (70.0%)
Useful for determining BMD	31 (22.1%)
Other	11 (7.9%)
Qualitative CT scan imaging	
Most sensitive diagnostic tool	68 (51.5%)
Lower cost *vs.* DXA	41 (31.0%)
Higher sensitivity *vs.* DXA	12 (9.1%)
Other	11 (8.3%)
Quantitative ultrasound densitometry (QUS)	
Does not measure BMD directly	29 (37.7%)
Predict fractures in postmenopausal women	28 (36.4%)
Not associated with any radiation exposure	16 (20.8%)
Other	4 (5.2%)
Dual-energy x-ray absorptiometry (DXA)	
Confirm a diagnosis of osteoporosis	55 (22.0%)
Predict future fracture risk	44 (17.7%)
Monitor BMD	59 (23.7%)
Best diagnostic tool	39 (15.7%)
Need long time	24 (9.6%)
Lower radiation *vs.* CT	16 (6.4%)
Other (specify)	12 (4.8%)

About 36.4% doctors used Quantitative ultrasound densitometry (QUS) because it can predict fractures in postmenopausal women. Around 23.7% participants preferred Dual energy X-ray absorptiometry (DXA) as it can monitor BMD **Table 6**.

TABLE 7: SIGNS, SYMPTOMS AND RISK FACTORS IDENTIFIED DURING DIAGNOSIS

	N (%)
Kyphosis	85 (9.0%)
Loss of height	67 (7.1%)
Low body weight	47 (5.0%)
Back pain	93 (9.9%)
History of fracture	76 (8.1%)
Family history of osteoporosis	46 (4.9%)
Daily calcium intake in diet	46 (4.9%)
Age	90 (9.6%)
Medical treatments currently taken by the patient	74 (7.9%)
Estrogen deficiency	88 (9.4%)
Post menopausal women	98 (10.4%)
Other disorders of the patient	35 (3.7%)
Lifestyle of the patient	92 (9.8%)
Other	3 (0.3%)

During examining a patient most of the doctors looked for certain sign and symptoms or risk factors like age (9.6%), kyphosis (9.0%), back pain (9.9%), post menopausal women (10.4%), life style of patient (9.8%) *etc*. **Table 7**.

Mostly prescribed drugs by the participants are biphosphonates (15.1%), calcium supplement (12.4%), hormone replacement therapy (10.6%), estrogen agonist/antagonist (9.6%) *etc*. **Fig. 1**.

For the prevention of osteoporosis mostly used drugs by the participants were biphosphonates (26.6% 0, hormone replacement therapy (25.9%), calcitonin (21.7%) *etc*. **Fig. 2**.

As per the study population most effective prevent tool of osteoporosis were regular physical exercise (29.7%), calcium rich diet (23.4%), calcium and Vitamin D supplement (17.0%) **Fig. 3**.
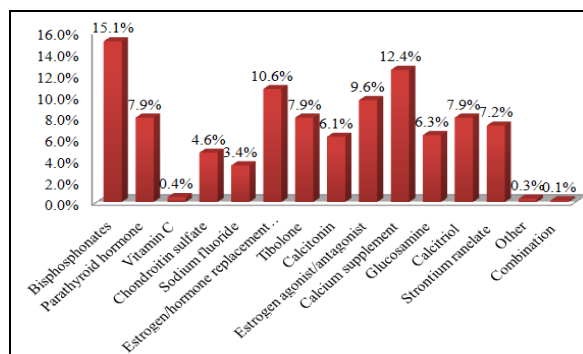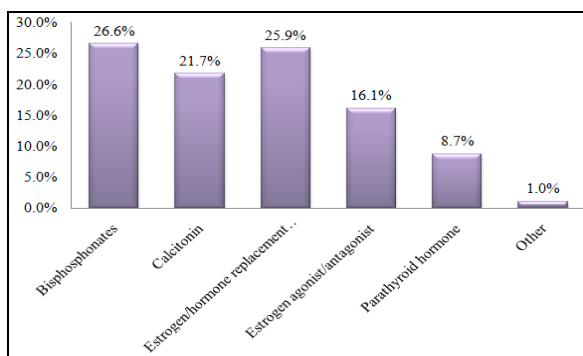

FIG. 1: DRUGS FOR TREATMENT OF OSTEOPOROSIS

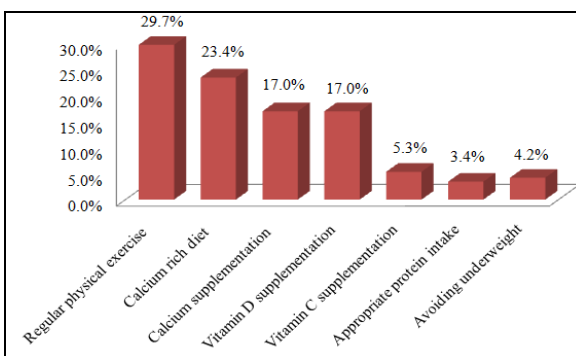**FIG. 2: DRUGS FOR PREVENTION OF OSTEOPOROSIS**

FIG. 3: PREVENTIVE TOOLS OF OSTEOPOROSIS

Majority of study population, 83% agreed that they were not aware of osteoporosis **Fig. 4**. Only 57% study population had accessibility to perform biochemical test **Fig. 5**.

Around 61% participants claimed that they had accessibility to perform BMD test **Fig. 6**.

DISCUSSION: Most common disease that is affecting human bone is osteoporosis. Annually around 200 million people suffer from this disease which represents a significant health and economic burden. OP is a major reason of fracture and it also causes people to become bedridden with serious complications [10].
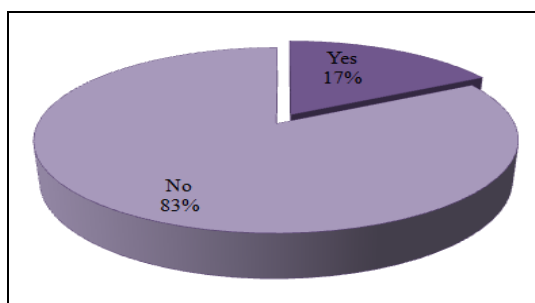
FIG. 4: AWARENESS AMONG PATIENTS REGARDING OSTEOPOROSIS
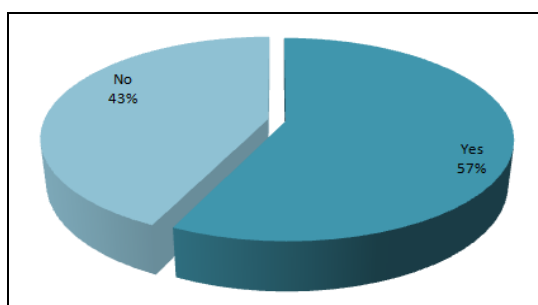

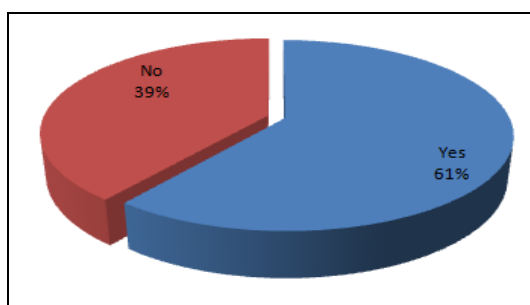**FIG. 5: ACCESSIBILITY TO PERFORM BIOCHEMICAL TESTS**

FIG. 6: ACCESSIBILITY TO PERFORM BMD TESTS

The knowledge level, attitude and practice of health care provider are important factors in the prevention and control of all chronic diseases and OP is not an exception. The current study was carried out to assess the practice pattern of osteoporosis among physicians in Bangladesh. Anderson M *et al*., (2005) performed a survey on orthopedic surgeons in France, Germany, Italy, Spain, the United Kingdom, and New Zealand where 50% of the surveyed participants received little or no training in osteoporosis. Only approximately one in four orthopedic surgeons in France, UK and New Zealand regarded themselves as knowledgeable about treatment modalities [11].

This result does not comply with the result of present study. In this survey, among the participated 107 doctors, 90 (84.1%) attended specialized osteoporosis programs, 96 (89.7%) had internet access at work place but only 68 (63.6%) had subscription in medical journal or website, so all were not utilizing their facilities to know or get updated about new researches of osteoporosis. Around 63 (58.9%) were using guidelines for OP treatment which accord the research of China conducted by Cindy LK *et al*., (2004) where 33% of the surveyed doctors were unaware of published guidelines [12]. Wilkes HC *et al*., (1991), performed a survey among general practitioners in UK where 9% female patients aged 40 to 64 were receiving hormone replacement therapy and 55% doctors were prescribing hormone replacement therapy [13]. This research result does not accord with the present study. In this current research, it was observed that most of the doctors around 15.1% preferred bisphosphonates, 12.4% preferred calcium supplements and 10.6% doctors preferred hormone replacement therapy for the treatment of osteoporosis.

That means, majority of the participants preferred bisphosphonates as the treatment option, which comply with the following research conducted by Soucy E *et al*., (2000) Canadian rheumatologists (CR) on their management of corticosteroid induced osteoporosis in their premenopausal (PrM) and postmenopausal (PoM) female patients. The most common initial choice for treatment of established osteoporosis was as follows: PrM: etidronate (53%); PoM: bisphosphonates +/- HRT (53%) [14]. Research performed by John GS *et al*., (2006) on orthopaedic surgeons in Utah, Idaho, and Wyoming also comply the present result findings. In the study, 74% felt most comfortable prescribing bisphosphonates and >77% felt most comfortable prescribing calcium and Vitamin-D supplements [15].

Analysis of present study showed that bisphosponates were also preferred most for the prevention of OP among the majority of the participants, about 26.6%. Other than bisphosphonates, calcitonin and hormone

replacement therapy were also prescribed by the doctors, around 21.7% and 25.9% respectively for the preventive purpose which does not accord with the findings of Wilkes HC *et al.*, (1991) where over half of the doctors preferred hormone replacement therapy for prevention of osteoporosis (62%) [13]. Preferred diagnostic tool was dual-energy X-ray absorptiometry among the majority study population, around 25.4% which is parallel to the findings of Dipaola CP *et al.*, (2009) and Soucy E *et al.,* (2000) [14, 16]. According to the majority of participants, around 70.0% used plain radiography for its usefulness in fracture prediction and 23.7% preferred dual-energy X-ray absorptiometry as it can monitor BMD. These comply with the findings of Saeedi, MY *et al.*, [17]

CONCLUSION: In conclusion, overall diagnosis and treatment pattern of osteoporosis seems good. Since this study was conducted on a small study population, the results do not reflect the treatment pattern in the entire country and further studies are required particularly in different settings to evaluate treatment pattern in other provinces among the rural and urban health care providers so that comparative inferences can be drawn. This will assist in empowering patients and health care workers with knowledge of osteoporosis and the importance of understanding treatment and management options.

CONFLICT OF INTEREST: Nil

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