

**ASSOCIATION OF INHALED CORTICOSTEROIDS AND OSTEOPOROSIS:  
ALBERTA PHARMACISTS' AWARENESS**

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Canada**\*Corresponding author e-mail:** [hoan@ualberta.ca](mailto:hoan@ualberta.ca)**ABSTRACT**

The use of inhaled corticosteroids (ICS) is the standard maintenance therapy in the management of asthma and moderate to severe chronic obstructive pulmonary disease (COPD). It is well recognized that systemic corticosteroid therapy is a risk factor for osteoporosis. There is a dose related increase in risk of fracture with ICS use and an inverse relationship between bone mineral density and duration and cumulative dose of ICS. The objective of the study is to assess Alberta pharmacists' awareness of ICS and its association with osteoporosis. An online survey was created through Google Document®. The URL link to the survey along with a letter of information was circulated to various pharmacy websites. Total of 104 pharmacists completed the survey. Only 60% of the pharmacists are aware of the risk of osteoporosis associated with high dose ICS (>2 mg inhaled beclomethasone/day or equivalent). Less than 50% of the pharmacists would recommend calcium and vitamin D to patients who are receiving long-term high dose ICS. Pharmacists are the most accessible health care providers and can play a pivotal role in identifying patients on ICS who are at risk of osteoporosis. More education is needed for pharmacists to raise the awareness of the association of ICS with osteoporosis.

**Key words:** Inhaled corticosteroid, osteoporosis, pharmacists**INTRODUCTION**

The use of inhaled corticosteroids (ICS) is the standard maintenance therapy in the management of asthma.<sup>1</sup> Also, ICS is recommended in patients with chronic obstructive pulmonary disease (COPD).<sup>2</sup> ICSs are highly effective in controlling inflammatory symptoms with minimal serious side effects associated with systemic absorption.<sup>3</sup> It is well recognized that systemic corticosteroid therapy is a risk factor for osteoporosis.<sup>1</sup> Studies showed that there is a dose-related increase in risk of fracture with ICS use.<sup>4-7</sup> In addition, there is an inverse relationship between bone mineral density (BMD) and the cumulative dose and duration of ICS therapy in patients with asthma.<sup>5</sup> Wong and colleagues, recommend that patients who require high dose of ICS for long term should consider receiving prophylaxis to prevent osteoporosis.<sup>5</sup> Recommendations:<sup>2,8-11</sup>

Currently, the recommendation is that patients receiving high dose ICS (> 2 mg beclomethasone/day or equivalent) or oral glucocorticosteroids at any dose are considered at risk of developing osteoporosis and fractures. The Global Initiative for Asthma (GINA) recommends:

1. Screening Bone Mineral Density (BMD)
  - a. Any patients with asthma and history of vertebral or other fractures that may be related to osteoporosis
  - b. Post-menopausal women taking > 2 mg inhaled beclomethasone or equivalent daily should receive bone mineral density (BMD) screening.
2. Osteoporosis is present if the bone density in lumbar spine or femoral neck shows:
  - a. T-score below -2.5 (2.5 standard deviations below the mean value of young normal subjects of the same sex in patients 19 – 69 years old)

- b. Z-score below -1 (1 standard deviation below the predicted value of age and sex)
3. Follow up repeat scanning
- a. In 2 year for patients whose initial scan is negative but continue with oral glucocorticoids.
  - b. In 1 year for patients with osteoporosis and have started treatment for osteoporosis.
4. Management
- In patients receiving high dose of inhaled corticosteroid > 2 mg beclomethasone daily or equivalent/day the following should be considered:<sup>1,12</sup>
- a. Smoking cessation
  - b. Calcium and vitamin D supplement
  - c. Women with osteoporosis up to 10 years post-menopausal should receive bisphosphonates or hormone therapy
  - d. Men, pre-menopausal women and women more than 10 years since menopause should consider treatment with bisphosphonates

Recent studies conducted in general practitioners showed that physicians do not use prophylaxis or treatment in patients receiving ICS with or without risk factors for osteoporosis in community setting.<sup>13,14</sup>

To date, there is no study assessing the awareness of ICS and its association with osteoporosis in other health care providers such as pharmacists. Since pharmacists are the most accessible health care providers in the community, they are in an excellent position to provide counseling and education to patients on ICS and osteoporosis prophylaxis or treatment. The objective of the study is to assess the awareness of ICS and association of osteoporosis from Alberta pharmacists.

## METHODS

Upon approval from the University of Alberta Health Research Ethics Board, an online 18-question survey in English was created through Google Document<sup>®</sup>. The URL link to the survey along with a letter of information was sent to Alberta Pharmacist's Association weekly newsletter, Canadian Society of Hospital Pharmacists – Alberta Branch monthly newsletter, and various Alberta pharmacist websites for 6 months. By proceeding with the online survey, it was implied that the responder gave consent.

Inclusion criteria:

1. All pharmacists registered in Alberta.

Statistics

Data are presented using descriptive parameters such as mean and standard deviation. All data are shown as total numbers and percentage.

## RESULTS

Of 4402 registered pharmacists in Alberta, 104 (2%) completed the survey. A majority (73%) of the responders are females, 82% of the responders practice in community pharmacy and 42% are recent graduates (less than 5 years). (Table 1) Almost 30% of the pharmacists dispense more than 20 ICS prescriptions every week, only 60% of pharmacists are aware there is an association between ICS and osteoporosis and 26% and 40% defined long-term as > 3 months and > 6 months respectively. When using specific beclomethasone daily dose as a decision parameter to recommend calcium and vitamin D supplement, the respondents chose: no recommendation regardless of dose (n= 50; 48%), 1600 mcg/day (n= 10; 10%), 800 mcg/day (n = 23; 22%), 400 mcg/day (n= 12; 12%), and 200 mcg/day (n= 9; 9%). In general, less than 50% would recommend calcium and vitamin D to patients receiving high dose ICS. (Table 2) Only 16% of the pharmacists would recommend a BMD screening to patients receiving high dose ICS. (Table 3)

## DISCUSSION

Majority of the pharmacists completed the survey practice in a community pharmacy and are recent graduates. Although our response rate was very low (2%), it is a good representation of the proportions of pharmacists currently practicing in Alberta. About 42% of pharmacists graduated less than 5 years ago completed the survey and currently there are 828 (19%) of registered pharmacists in Alberta graduated less than 5 years ago. There is no consensus with the definition of long-term ICS use among the pharmacists. Less than half of pharmacists would recommend calcium and vitamin D and most would not recommend a BMD to patients receiving high dose ICS.

Currently there has not been any study evaluating the pharmacists' awareness of the association between ICS and osteoporosis. However, there has been one study, which assess primary and secondary osteoporosis prophylaxis to the use of ICS prescribed by general practitioners.<sup>13</sup> The study showed that general practitioners in Denmark do not use primary or secondary prophylaxis in patients treated with ICS with or without risk factors. In our study, 50% of the responding pharmacists recommend calcium and vitamin D to patients who are concurrently on oral glucocorticosteroids, only 4.7% of general

practitioners in Neilsen's study did. Only 34% of pharmacists in our study would recommend calcium and vitamin D to patients receiving chronic ICS at any dose. Less than 1% of general practitioners would prescribe prophylactic treatment even when the patients already have radiographic findings of osteoporosis.<sup>13</sup> Since calcium and vitamin D are over the counter products and as such are readily available to the public without a prescription from the physician, pharmacists are in a primary position to make an impact in addressing this issue. Only 16% of pharmacists and 1% general practitioners would recommend BMD screening to patients receiving high dose ICS. The reason for the pharmacists being reluctant to make this recommendation is they felt it is not within their scope of practice. In both studies, pharmacists and general practitioners show there is no consistent definition of long-term use.

**Strength and limitations of this study:** To the best of our knowledge, this is the first study that assesses the awareness of pharmacists with the association of ICS and osteoporosis. The main strength of this study is the responders are a good representation of current practicing pharmacists in Alberta. Since a majority of the responders are from pharmacists practicing in community pharmacies, the results could be generalized to Alberta pharmacists practicing in community pharmacies. The major limitation to the study is that not all pharmacists are registered with Alberta Pharmacist's Association, and Canadian Society of Hospital Pharmacists – Alberta Branch. This resulted in a low response rate.

**Implications for future research, policy and practice:** In the absence of clearly defined what

long-term ICS use is, osteoporosis prevention in inhaled corticosteroid users is poorly addressed. Additional patient education by pharmacists may be warranted to help patients incorporate more vitamin D and calcium in their diet or through supplementation. The results from this study showed that although 60% of pharmacists are aware of the association between ICS and osteoporosis, continuous education for pharmacists on their potential role in intervention in this issue is still needed. Pharmacists could introduce patients to government and medical websites that provide recipes and list of different food sources that are rich in vitamin D and calcium. Since both vitamin D and calcium are over the counter products and do not require a prescription from physicians, pharmacists are in the ideal position to identify patients at risk for osteoporosis and recommend appropriate supplement. Further studies are necessary to support the finding in our study. They could utilize advanced methods to ensure greater response rate and expand the scope to include community pharmacists across Canada.

#### ACKNOWLEDGEMENT

We would like to express our gratitude to Natosha Eccles, community pharmacists in Alberta, and Alberta Pharmacists' Association.

#### CONFLICT OF INTEREST

The authors have no conflicts of interest to declare in relation to this article.

#### FUNDING

This research project was unfunded.

**Table 1: Demographics**

PARAMETERS	n (%)
<b>Sex</b>	
F	76 (73)
M	28 (28)
<b>Practice Setting</b>	
Community	85 (82)
Hospital	6 (6)
Others	13 (12)
<b>Work Experience (year)</b>	
<5	44 (42)
5 – 9	19 (18)
10 – 14	12 (12)
15 – 20	14 (13)
> 20	15 (14)

**Table 2: Recommendation for calcium and vitamin D**

	<b>YES</b> <b>n (%)</b>	<b>NO</b> <b>n (%)</b>
<b>Patients already receiving oral glucocorticosteroid</b>	52 (50)	52 (50)
<b>Post-menopausal women receiving long-term high dose ICS</b>	69 (66)	34 (34)
<b>Post-menopausal women receiving any dose of ICS</b>	64 (62)	40 (38)
<b>Long-term ICS with risk factors</b>	72 (69)	32 (31)
<b>Long-term high dose ICS</b>	48 (46)	56 (54)
<b>Chronic ICS at any dose</b>	35 (34)	69 (66)

**Table 3: Recommendation for BMD screening**

	<b>YES</b> <b>n (%)</b>	<b>NO</b> <b>n (%)</b>
<b>Post-menopausal women receiving long-term high dose ICS</b>	34 (33)	70 (67)
<b>Post-menopausal women receiving any dose of ICS</b>	27 (26)	77 (74)
<b>Long-term high dose ICS</b>	17 (16)	87 (84)
<b>Chronic ICS at any dose</b>	8 (8)	96 (92)

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