Effects of Community-based Primary Prevention Interventions on Preventive Behaviours of Osteoporosis among Older Adults: A Systematic Review

Cheuk Wai CO[1], Tsz Kin CHEUNG[2], Tin Shun Titan MAK[1], Tzu Tsun LUK[1,3]

1 School of Nursing, Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China
2 Li Ka Shing Faculty of Medicine, The University of Hong Kong, Hong Kong SAR, China
3 Alice Lee Centre for Nursing Studies, Yong Loo Lin School of Medicine, National University of Singapore, Singapore

Background

Current studies mainly focus on Osteoporosis (OP) programs targeting tertiary prevention, e.g. rehabilitation and recovery

- **Limited focus on primary prevention of OP**

OP is a degenerative disease that progresses over the years but can often be prevented through behavioural changes

- **Effectiveness of interventions aimed at promoting such changes remains unclear**

In Hong Kong, ageing and delayed retirement present additional challenges

- **Highlighting the need for population-based interventions tailored to specific demographics, e.g. retirees, rather than focusing solely on post-menopausal women**

This study systematically evaluates the effectiveness of community-based primary prevention interventions on modifiable factors, OP-related knowledge, and perceptions.

Method

We systematically searched 5 electronic databases (PubMed, EMBASE, CINAHL PLUS, Scopus, Web of Science) to identify studies published from inception to November 1, 2024. Study quality was assessed using the Cochrane risk-of-bias tool (RoB 2). The study was registered with PROSPERO (CRD42024605226).

	Inclusion Criteria
Population	Older adults aged 60 or above
Intervention	Community-based primary prevention interventions
Outcomes	• Preventive behaviors on OP • Knowledge on OP • Perceptions on OP
Study Design	Randomized controlled trials
Publication Year	No limitations
Languages	Published in English only

Result

Of 2463 records screened, **11 papers** reporting findings from **9 RCTs** (N=38,115) were included. Interventions included physical exercise (3 studies), education (3 studies), and mixed programs (3 studies).

- **Preventive behaviours:** Inconclusive for exercise level and calcium intake, though 3 studies on behaviour to **perform screening** showed significant increases.
- **OP knowledge, self-efficacy, health-belief and self-perceived preventive behaviour:** Showed insignificant improvement, except for **perceived susceptibility**, which increased significantly.
- **Bone mineral density:** All 3 studies measuring bone mineral density reported significant increases.
- All studies possess a high risk of bias.

Study	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
D1	X	+	-	X	+	-	-	+	+
D2	X	X	X	+	X	X	X	X	X
D3	+	+	X	+	+	X	+	+	+
D4	X	X	X	+	X	X	X	X	+
D5	-	-	-	-	-	-	-	X	-

Judgement: X High - Some concerns + Low

Domain	**Scale/ Instrument Adapted**
Physical activity (4/9)	• Frandin-Grimby Activity Scale (1/4) • Community Health Activities Model Program for Seniors (1/4) • Tri-axial accelerometer (1/4) • **Self-designed questionnaire (1/4)**
Dietary change; calcium intake (2/9)	• 3-day dietary record (1/2) • 24-hour Food Diaries (1/2)
Behavioural change (3/9)	• Screening percentage (1/3) • Health Behavior Scale (1/3) • **Self-designed questionnaire (1/3)**
Knowledge (3/9)	• OP Knowledge Assessment (1/3) • **Self-designed questionnaire (2/3)**
Self-efficacy (3/9)	• OP Self-efficacy Scale (2/3) • **Self-designed questionnaire (1/3)**
Health belief (4/9)	• OP Health Belief Scale (3/4) • **Self-designed questionnaire (1/4)**

D1: Bias arising from the randomization process.
D2: Bias due to deviations from intended intervention
D3: Bias due to missing outcome data.
D4: Bias in measurement of the outcome.
D5: Bias in selection of the reported result.

Discussion

There is a **lack of structured and large-scale community preventive interventions** aimed at preventing OP development in vulnerable older adults, despite the potential health risks. **Existing studies have limited applicability in Hong Kong due to unique local demographics**, e.g. the large number of non-retirees who are at risk of developing OP. Future research should focus on:

(1) **Development of standardized interventions** with higher applicability to the local population, especially focusing on physical activity, an integral component of OP prevention that current strategies fail to target effectively

(2) **Application of validated measurement tools** to better assess the impact of interventions on preventive behaviours and related outcomes, enhancing evaluation accuracy and ensuring their effectiveness is well-documented.

Funding: This research did not received any funding.
Declaration of Interest: All authors have no conflicts of interest.

Contact us:
Mr. Cheuk Wai CO: cocw@connect.hku.hk
Mr. Tsz Kin CHEUNG: u3619372@connect.hku.hk