

# What did we learn from a Community Bone Health Promotion Project for People with Mental Retardation?

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## Article Info

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## Abstract

**Background:** The Community Bone Health Promotion Project offered service to the individual Mentally Retarded person (MR) together with his/ her personal care-givers as a unit. The MR tends to get old and suffer from chronic diseases much earlier than the general population. The care-giving parent is older by age and yet could serve as a “control” in the assessment exercises.

**Methods:** The project took a multidisciplinary approach participated by the social workers, medical experts, nurses and therapists to ensure support and compliance. The promotion of bone health was executed through ordinary physical exercises, machine-driven trainings and dietary support. A special dietary supplement with Traditional Chinese Medicine orientation was chosen for the clients who were expected to have extra appreciation because of the cultural heritage.

The project lasted 12 months after which the assessments included objective measurements of Bone Mineral Density (BMD) and subjective evaluation of Quality of Life (QoL).

**Results:** Of the 136 participants, 55 were patients with MR and 81 were caregivers. The average age of patients with MR was 52.7 years old, and that of caregivers was 62.2 years old. Compliance of the clients and their caregivers had been very good and great appreciations were expressed. The special dietary supplement with medicinal herb extracts was well loved by both MRs and caregivers. BMD, as expected, did not show significant change after 12 months although a trend of improvement was obvious among the more deficient individuals. Caregivers of older ages could be more responsive compared with the younger MRs.

In conclusion, it was a fruitful project endorsing the multidisciplinary approach in the planning, executions, supervision and assessment. The improvements in Physical functioning, Role physical and Role emotional were shown in the Quality of Life evaluation, further supported the enthusiasm and appreciation of the MRs and their caregivers.

## Introduction

People with mental retardation (MR) or mental disability are prone to early-onset aging, and they are more likely to develop age-related chronic diseases, usually 20-30 years earlier than the general population. The caring needs for the MR's, as expected, would be significantly high. The common chronic diseases among the MR's include hypertension, diabetes, coronary heart disease, osteoporosis, skeletal problems, stroke and brain degeneration. With regard to osteoporosis, MR's over 40 years of age have a three times more chance of suffering from low bone mineral density (BMD) compared with the general population<sup>1-3</sup>. The consensus

is that the low BMD in the MR's will continue to decline with age<sup>4</sup>. Moreover, other risk factors unfavorable for BMD might co-exist in the MR's, which include thyroid and gonadal dysfunctions, musculoskeletal defects, nutritional deficiencies, and sometimes over-medications<sup>2</sup>. Maintaining good bone health is of utmost importance for this population.

While insufficient physical activity is the most important cause of bone loss<sup>5</sup>, it is not easy to enforce sufficient weight bearing activities for the MR groups. Indeed, people with MR have been reported in various studies to be highly deficient of physical exercises<sup>6</sup>.

In Hong Kong, the number of MR's has been estimated to be around 100,000 (Hong Kong Government Statistics 2014). It is well known that people over the age of 50 are more likely to suffer from chronic diseases and need additional care<sup>7</sup>. In addition, the severity of their Mental Retardation as stated earlier, complicates the management of the co-existing pathologies related to the cardiovascular and skeletal systems.

The complexity of health care needs of MR group brings difficulties to its management, nursing and attention. In most cases, the direct caregivers of MR patients are their parents, they are older, and they may not be the best person to give the necessary care and support. When the care and attention given to a "prematurely" aging MR person come from a genuinely aging parent or parents, an often quoted situation of a "double aged" or "triple aged" family become a common reality in the Hong Kong Community.

The aim of this study was to ascertain a multidisciplinary approaches (*Fructus Ligustri Lucidi* (FLL) contained milk powder, Strengthening bone exercises (V-health) and physical activity) for bone mineral density in persons with MR and their caregivers.

## Methods

### A Community Bone Health Promotion Project for the MR people

#### Design

The study was an observational, cross-sectional study. Patients with MR and their caregivers were recruited to participate in the study.

The project was initiated and planned by the Evangelical Lutheran Church Social Service - Hong Kong (ELCHK). The service was to be given not only to the MR people but also to the caregivers, in other words, all members of the "double aged" or "triple aged" family. Bone Health was chosen to be the common target since all elderlies were under the challenge of bone loss which commonly lead to fractures and multiple disabilities<sup>8,9</sup>. Bone health is particularly at risk because elderly people (especially MR) have problems

with mobility, which not only leads to bone loss, but also leads to accidental falls.

ELCHK is known for caring about the welfare of the elderly. According to the project plan, bone health will be promoted through exercise, training and special dietary supplements.

A multidisciplinary approach was designed, in which social workers were responsible for organization and coordination; nurses and therapists were responsible for supervising exercise training; medical experts were responsible for interpretation and consultation; and technicians were responsible for assessing the bone density.

#### Participants

Participants over 39 years were included in this study. No specific inclusion criterion was required. Body weight and height were measured according to a standard procedure. Participants were assessed BMD through dual-energy X-ray absorptiometry (DXA)<sup>8</sup> at the Jockey Club Centre for Osteoporosis Care and Control (JOCOC) in the Chinese University of Hong Kong from August 2017 to February 2019.

#### The study outcomes

BMD were measured with Dual X-ray absorptiometry (Hologic 4500 DEXA Bone Densitometer). Dual X-ray absorptiometry (DXA) is the standard procedure for measurement of BMD. BMD measurements were taken at the hip and spine, and results expressed in g/cm<sup>2</sup>,

Strengthening bone exercise (V-Health, Model: VH-001) and physical activity were required during study period.

#### Interventions

Interventions included intake of *Fructus Ligustri Lucidi* (FLL) contained milk powder (milk intake), Strengthening bone exercise (V-health), and physical activity (exercise). Presumably, the elderlies would find it more interesting and keep the compliance better<sup>10,11</sup>.

Dietary supplements are considered important and provide a special cultural orientation for the elderly to make them more compliant. As the people of Hong Kong, especially the elderly, enjoy a long history of traditional Chinese medicine culture, special nutritional dietary supplements containing herbal extracts are particularly welcome. Indeed, the supplement offered to the MR families was a milk product containing a herbal extract of *Fructus Ligustri Lucidi* (FLL), a plant product proven to support bone metabolism<sup>12,13</sup> and improve BMD.

The study was an observational, cross-sectional study. MR's over 39 years of age and their caregivers were recruited for a study lasting 12 months.

Repeated explanations, counsellings and supervisions were required to ensure the proper practice of physical exercise and most importantly, to maintain safety. Objective assessments included Pre and Post Interventional Dual X-ray absorptiometry for Bone Mineral Densities (BMD) of the spine and hip region. Subjective assessment was done using the Quality-of-Life Questionnaire (QoL, SF-36).

Dietary supplement started after the first BMD taking. It consisted of 20 grams of a special FLL added full milk power, to be taken daily for 12 months.

Both MR's and their caregivers were given the same treatment. This was considered the best practice to ensure compliance of the MR's, while, at the same time, their caregivers could serve as older, but more energetic controls.

### Statistical analysis

Data were analyzed by using student t-test, man Whitney test, paid t-test, ANOVA and multiple linear regression. SPSS 25 software was used for data analysis.

ANOVA and paid t-test were used to determine mean differences in BMD between pre- and post-treatment. A P value of less than 0.05 was considered to be statistically significant.

### Results

150 participants with MR and their caregivers were screened. 136 subjects (37 men and 99 women) were eligible and completed the study. The mean age was 58.4 years (from 39 to 82 years).

The following tables (Tables 1-3) give a summary of the observational results.

There were no significant differences between the pre- and post-treatment Hip BMD for both MRs and Caregivers.

There was a trend of slight improvement after 12 months, especially among the deficient groups.

With regard to the Quality of Life assessment, Table 4 gives the subjective information, in which PF, RP and RE were significantly improved, but BP declined.

**Table 1** Characteristics of the participants

	Number (N)	mean ± SD
Age (year)	136	58.4±8.5
MR	55	52.7±7.4
Caregiver	81	62.2±7.5
Height (cm)	136	154.5±8.3
Weight (kg)	136	57.2±9.8

MR: Mental Retarded

**Table 2.** BMD changes in total hip

Participant	Pre-treatment (g/cm <sup>2</sup> )	Post-treatment (g/cm <sup>2</sup> )	P value
MR(n=55)	0.7250±0.1202	0.7210±0.1256	0.205
Care-giver (n=81)	0.7853±0.1122	0.7831±0.1102	0.245

ID: Intellectual Disability

**Table 3.** BMD changes in spinal

Parameter	Pre-treatment (g/cm <sup>2</sup> )	Post-treatment (g/cm <sup>2</sup> )	P value
MR (n=55)	0.8597±0.1298	0.8623±0.1288	0.251
Care-giver (n=81)	0.8319±0.1456	0.8406±0.1420	0.022
BMD normal (n=54)	0.9377±0.1157	0.9420±0.1167	0.314
Deficient Osteopenia (n=69)	0.7911±0.1148	0.7969±0.1114	0.171
Deficient Osteoporosis (n=13)	0.7262±0.1214	0.7431±0.1153	0.177

**Table 4.** Quality of Life changes under the eight subsections of SF-36

Parameter	Visit 1 (Baseline)		Visit 3 (Post-Treatment)	
	MR (SD)	Caregiver(SD)	MR(SD)	Caregiver(SD)
PF	61.3(34.5)	82.6(16.5)	62.5(35.2)	89.3(11.3)**
RP	82.1(31.8)	63.9(40.5)	91.7(26.6)	84.6(33.2)**
BP	11.7(22.6)	23.3(23.1)	5.0(14.7)*	12.6(15.0)**
GH	47.0(13.5)	53.6(9.3)	48.0(4.5)	52.0(9.1)
VT	67.5(3.5)	59.7(14.8)	62.5(3.5)	59.0(9.8)
SF	51.6(4.4)	49.7(11.2)	50.0(0.0)	50.0(2.8)
RE	93.3(23.2)	74.0(39.2)	95.0(22.4)	93.5(21.9)**
MH	66.7(12.6)	62.1(8.9)	65.3(9.4)	63.2(7.8)

\*p<0.05; \*\*p<0.01 compared with baseline;

**Abbreviations:** PF- Physical functioning, RP-Role physical, BP-Bodily pain, GH-General health, SF-Social functioning, RE-Role emotional, MH-Mental health

### Discussion

The ELCHK organized the Bone Health Promotion Community Project with the special aim of helping the MR group of people who were known to get old prematurely and were particularly prone to chronic illnesses. Osteoporosis was of special concern because of co-existing mobilization problems. Instead of confining the MR individuals as the service clients, this project wisely took their caregivers (mostly the parent or parents) together as a service unit. The caregivers served as the 'controls' to the MR in spite of the older age, while at the same time, their close relationship ensured better compliance from the MRs.

This special arrangement had been proven of great value in this project. The overall compliance had been good; both MR and caregivers enjoyed the training sessions and dietary supplements.

A close look at the BMD changes showed that on recruitment, the general bone health of the MRs was inferior to their caregivers. After intervention, only slight improvement was observed in both groups but the younger age of the MR group could be hindering interventional responses while the older caregivers showed better maintenance of bone density.

Several behavioral, physiological, and genetic factors contribute to low BMD and osteoporosis. Specifically, physical activity, dietary calcium, vitamin D intake, smoking, family history, menopause in women and excessive alcohol intake are all related to bone health<sup>14-16</sup>.

The project offered triple interventions: 2 types of Exercises (strengthening bone exercise (V-health), and physical activity) and Dietary Supplement. Physical exercises should be most demanding for the elderlies, but the provision of the vibration machine might have guaranteed more enthusiasm. In spite of the double offer, old age and compliance could still jeopardize the results. A daily supply of dietary supplement offered extra safe guard to the 12 months' long commitment required in this project.

Working with this special group of MRs and their caregivers requires a clear understanding of the difficulties. A lengthy observational period of 12 months was essential. Apart from a single objective assessment of BMD (which was expected to have only minimal changes), explorations on the subjective feeling of wellness were fulfilled through the Questionnaire of SF36 (Table 4). The most encouraging quality of life improvements was felt related to physical functions (PF), role physical (RP) and role emotional (RE). The QoL findings indirectly confirmed the excellent compliances of the target groups. Perhaps the positive results could also illustrate the enthusiastic support given by the target groups in appreciation of the care and concern they received.

## Conclusion

In conclusion, this project has been successfully carried out on a unique group of individuals. A multi-disciplinary approach has been applied in the planning and execution, using multi-target assessments. While dietary supplement could be the easiest way to maintain compliance with the caregivers' support, the other more basic interventional exercises could still have contributed a lot towards the final whole-hearted appreciations of the "double aged families" as was revealed in the QoL study. BMD assessments require longer periods of follow-up. The steadiness and minor up-grades should not disappoint the clients. Instead, the BMD result could be considered additional supportive data for the project.

The involvement of traditional medicine in this project was a clever commitment. With the expected general lack of strong enthusiasm among the MR people, and their caregivers, applying the principle and practice of Traditional Chinese Medicine which most elderlies in Hong Kong accept as a cultural heritage, could have been a motivating factor determining enthusiasm and compliance.

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## Conflict of interest

The authors state no conflict of interest.

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