University of South Australia

School of Health Sciences

Best Research Evidence Summary

Hydrotherapy for improving bone mineral density, function and balance in postmenopausal women with or at risk of osteoporosis

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Course: Evidence Based Practice 3

Period conducted: 2015

Question: What is the evidence of effectiveness of hydrotherapy for postmenopausal women with or at risk of osteoporosis on bone mineral density, function and balance when compared to standard care?

Search Strategy: A range of databases were searched using appropriate limits, truncations, MeSH terms and subject headings. The following table summarises the search process.

Databases	*Search Terms*				*Limits*	*Database Specifics*
	Population	*Intervention*	*Comparator*	*Outcome*		
OvidSP (Medline and Embase) CINAHL Scopus Cochrane	Postmenopause / OR menopause/ OR climacteric/ OR climacteric OR post?menopaus* OR menopaus* OR "change adj2 life" OR older women OR elderly women	Hydrotherapy/ OR hydrotherap* OR water exerc* OR water therap* OR aquatic therap* OR aquatic exerc*	(Optional) Standard care*	(Optional) "Bone densit*" OR "bone mineral densit*" OR function*	Human, English, Embase: limit to Embase	MeSH headings, key words, Boolean, truncation
PEDro	Postmenopausal women	Hydrotherapy	(Optional) Standard care*		Human, English	Keywords, no Booleans, simple search option, single line search

Key: / MeSH headings; *truncation symbol; 'OR' Boolean between words and 'AND' Boolean between PICO column

Clinical effects of hydrotherapy on BMD, balance and function:

There is some evidence for the effectiveness of hydrotherapy, when compared to no exercise, at improving BMD, balance and function in postmenopausal women with or at risk of osteoporosis. There is, however, no clear evidence to suggest that hydrotherapy is superior when compared to other forms of exercises, such as land based. BMD, measured by DXA, in particular, was found to be significantly improved following hydrotherapy. Therefore, we recommend that physiotherapists are aware of these benefits and use hydrotherapy programs as an alternative to land based exercise programs.

From a clinical point of view, hydrotherapy may be particularly useful for patients for whom land based exercises may not be suitable due to falls risk, non-weight bearing status or difficulties exercising on land. However, physiotherapists must also be aware of access and cost issues associated with hydrotherapy, which may act as barriers in some instances.

While there is emerging evidence to support the effectiveness of hydrotherapy for postmenopausal women with or at risk of osteoporosis, the current best research evidence is heterogeneous and of poor methodological quality. Lack of power calculations, missing intention-to-treat analyses and lack of assessor blinding all contribute to high risk of bias. Measurement of outcomes, in particular balance and function, was varied and inconsistent with no universal standardised protocol for the intervention. As a result, it is difficult to draw unequivocal conclusions about the effectiveness of hydrotherapy and hence make recommendations about its parameters for use in clinical practice.

Study	Research design	n	Participant type and agev	Intervention	Comparator (s)	Outcome (s)	Results	Main findings
Arnold et al. (2008)	RCT	68	PM women with OP Aged >60 years	**LE & HT** both 3 sessions/wk over 20wks, sessions 50 mins.	**CG-** Participants requested not to change their activity level.	BTW Functional abilities domain of OFDQ	HT significantly ↑ BTW c/w LE (p=0.010). Not significant c/w CG. LE significantly ↑ OFDQ score c/w HT (p=0.018). Not significant c/w CG.	No differences in balance or function in women with OP who followed HT or LE programs c/w CG.
Bocalini et al. (2010)	RCT	50	Older PM women Aged >62 years	**HT** - 3 session/week over 12wks, sessions 60 mins. Followed by 6 wks detraining period only continuing with usual daily activities	**CG-** Participants requested to continue with regular daily activities	800mWT SLS	*Post intervention:* HT significantly ↑ 800mWT c/w baseline & CG (p<0.05). *Post 6 weeks detraining:* 800mwt ↓ c/w score post HT intervention (p<0.05), but remained significantly higher than baseline & CG (p<0.05). *Post intervention:* HT significantly ↑ SLS c/w baseline & CG (p<0.05). *Post 6 weeks detraining:* SLS significantly ↓ c/w score post HT intervention (p<0.05), no significant change c/w CG (P>0.05) but remained significantly higher than baseline (p<0.05).	HT showed significant improvements in function & balance c/w CG & baseline. Post intervention detraining significantly decreased function & balance scores with some retention of the gains from baseline.
Fronza et al. (2013)	RCT	108	Non exercising PM women with and without # Aged 45-80	**HT** - 3 sessions/wk over 24 wks, sessions 50 mins.	**CG** - no description given (divided into two subgroups groups based on fracture status)	BMD (DXA g/cm2 & T-score) No. of falls	HT group with # significantly ↑ BMD c/w CG with # (p<0.05). HT group without # significantly ↓ number of falls (p<0.05).	HT improved BMD and T-scores in PM women with fractures. The intervention was safe for the spine even with the presence of fractures.

Study	Research design	n	Participant type and agev	Intervention	Comparator (s)	Outcome (s)	Results	Main findings
Moreira et al. (2013)	RCT	108	Sedentary women, PM for minimum 5 years Average age 59 years	**HT** - 3 times/wk over 10 months, session 35 mins.	**LE** - 3 times/wk over 10 months, sessions 55 mins.	BMD (DXA g/cm2 & T-score) BBS 6MWT	LE significantly ↑ in all measured parameters c/w baseline (p<0.001). Significant difference between groups in favour of LE in 6MWT & BMD (p<0.001). There was no significant difference in BBS between groups. HT ↑ 6MWT c/w baseline (p<0.001).	LE showed significant improvements in physical function & BMD c/w HT. No significant differences in balance evident between LE & HT. HT was less effective overall.
Murtezani et al. (2014)	RCT	64	PM women, recent Dx of OP, admitted to outpatient clinic, no Hx of # Aged 50-70 years	. **HT** - 3 times/wk over 10 months, session 35 mins	. **LE** - 3 times/wk over 10 months, sessions 55 mins.	BMD (DXA g/cm2 & T-score) BBS 6MWT	LE significantly ↑ in all measured parameters c/w baseline (p<0.001). Significant difference between groups in favour of LE in 6MWT & BMD (p<0.001). There was no significant difference in BBS between groups. HT ↑ 6MWT c/w baseline (p<0.001).	LE showed significant improvements in physical function & BMD c/w HT. No significant differences in balance evident between LE & HT. HT was less effective overall.
Pernambuco et al. (2013)	RCT	84	PM women with low BMD Aged 60-77 years	. **HT** - 2 times/wk over 8 months, sessions 50 mins	**CG** – participants requested to engage in no regular physical activity	BMD (DXA g/cm2 & T-score) GDLAM (RVDP, RCMH, 10mWT & PRTS)versus UC =0.14 SoS = 11.44, p=0.04 QoS = 17.11, p=0.03 SPNCS score p=0.21	No difference between HT & CG in femoral & Lx (L2-L4) BMD. HT ↑ in RVDP & RCMH components c/w baseline (p<0.05). CG ↑ in PRTS but ↓ in other GDLAM components (p<0.05). HT significantly ↑ 10mWT, RVDP, RCMH & PRTS c/w CG (p<0.05	No statistically significant differences between HT and CG for BMD. HT showed significant improvements in 10mWT, RVDP and RCMH.
Tsourlou et al. (2006)	RCT	247	Older women w/out MSK or CV disorders or DM	**HT** - 3 times/wk over 24 wks, sessions 60 mins	**CG** - no description provided	TUG test	HT significantly ↑ TUG test score (19.8%) c/w baseline (p<0.0125) & had significantly lower average time to complete TUG test c/w CG (5.09sec vs 6.23sec)(p<0.125)	HT significantly improved TUG score c/w CG & baseline.

Study	Research design	n	Participant type and agev	Intervention	Comparator (s)	Outcome (s)	Results	Main findings
			Aged 60-75 years					
Vanaky, Sadeghi & Rameza ni (2014)	RCT	20	Women minimum 12 months PM Aged 50-70	**HT** - 3 times/wk over 12 wks, sessions 40-60 mins.	**CG** – participants requested to engage in no regular physical activity	BMD (DXA)	HT significantly ↑ BMD at the Lx & NOF sites c/w CG ($p<0.05$).	Significant improvement in BMD with HT c/w CG.

Legend

10mWT = 10 meter walk test, **6MWT** = six minute walk test, **800mWT** = 800m walk/run test, **BBS** = Berg balance scale, **BMD** = bone mineral density, **BTW** = backward tandem walk, **CG** = control group, **CTx** = bone resorption marker, **CV** = cardiovascular, **c/w** = compared with, **DM** = diabetes mellitus, **Dx** = diagnosis, **DXA** = dual-energy X-ray absorptiometry, **FAS** = functional assessment aystem, **FRT** = functional reach test, study,	**GDLAM** = the protocol of the Latin American Group for Maturity, **HT** = hydrotherapy, **Hx** = history, **LE** = land exercises, **Lx** = lumbar spine, **MSK** = musculoskeletal, **n** = number of participant in a single study, **NOF** = neck of femur, **OP** = osteoporosis, **P1NP** = bone formation marker, **PM** = postmenopausal	**PRTS** = putting on and removing a large t-shirt while standing with arms at sides and t-shirt in dominant hand, **OFDQ**= OP functional disability questionnaire, **RCT** = randomised control trial, **RVDP** = rising from ventral decubitus position (prone), **RCMH** = 5 meter walk test involving rising from sitting, walking around cones and sitting back down, **SLS** = single leg stance, **STS** = sit to stand, **T-Score** = comparison of BMD to that of a healthy 30-year-old, **TUG** = timed up and go, **wk** = week, **#** = fractures, ↑ = increased ↓ = decrease

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