



Effect of coenzyme Q10 in neurodegenerative disorders

A meta-analysis of randomized controlled trials

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INTRODUCTION



- Mitochondria plays many important roles in cellular function; ATP generation, antioxidation
- Reduced coenzyme Q10 functions maybe implicated with pathophysiology of certain neurodegenerative diseases
- A few clinical studies showed efficacy of coenzyme Q10 supplementation in slowing the progression of diseases, nevertheless , conflicting evidence exist

OBJECTIVES



- To systematically review current evidence of coenzyme Q10 use in neurodegenerative diseases, focusing on efficacy and safety outcomes
- To determine effects of coenzyme Q10 on clinical outcomes in patients with neurodegenerative disorders

Literature searching

- Multiple computerized database; EMBASE, PUBMED, CINAHL, Cochrane, Clinicaltrial.gov, PsychInfo
- Keywords: *“coenzyme Q10”, “ubiquinone”, “neurodegenerative disorders”*
- Two investigator independently reviewed articles retrieved
- Any disagreement resolved by discussion with the third investigator

Study selection

- Randomized, placebo controlled studies
- Assessing effect of Q10 among neurodegenerative populations
- Evaluating quality of studies using JADAD scores and risk of bias assessment tool

Data extraction

- Standardized table
- Patient characteristics (age, sex, co-morbidities)
- Details of intervention (dose of Q10 supplementation, duration of treatment)
- Outcome measurement

Data analysis

- The weighted mean difference (WMD) were analyzed to compare outcomes in Q10 group and control group
- Meta-analysis performed using DerSimonian and Liard method under random effect model

Outcome measurement

- TOTAL UNIFIED PARKINSON'S DISEASE RATING SCALES (Total UPDRS; comprising domain I, II, III)

UPDRS I
Mental

UPDRS II
Daily activities

UPDRS III
Motor functions

Increasing severity with higher scores



Outcome measurement

- SCHWAB & ENGLAND ACTIVITIES OF DAILY LIVING

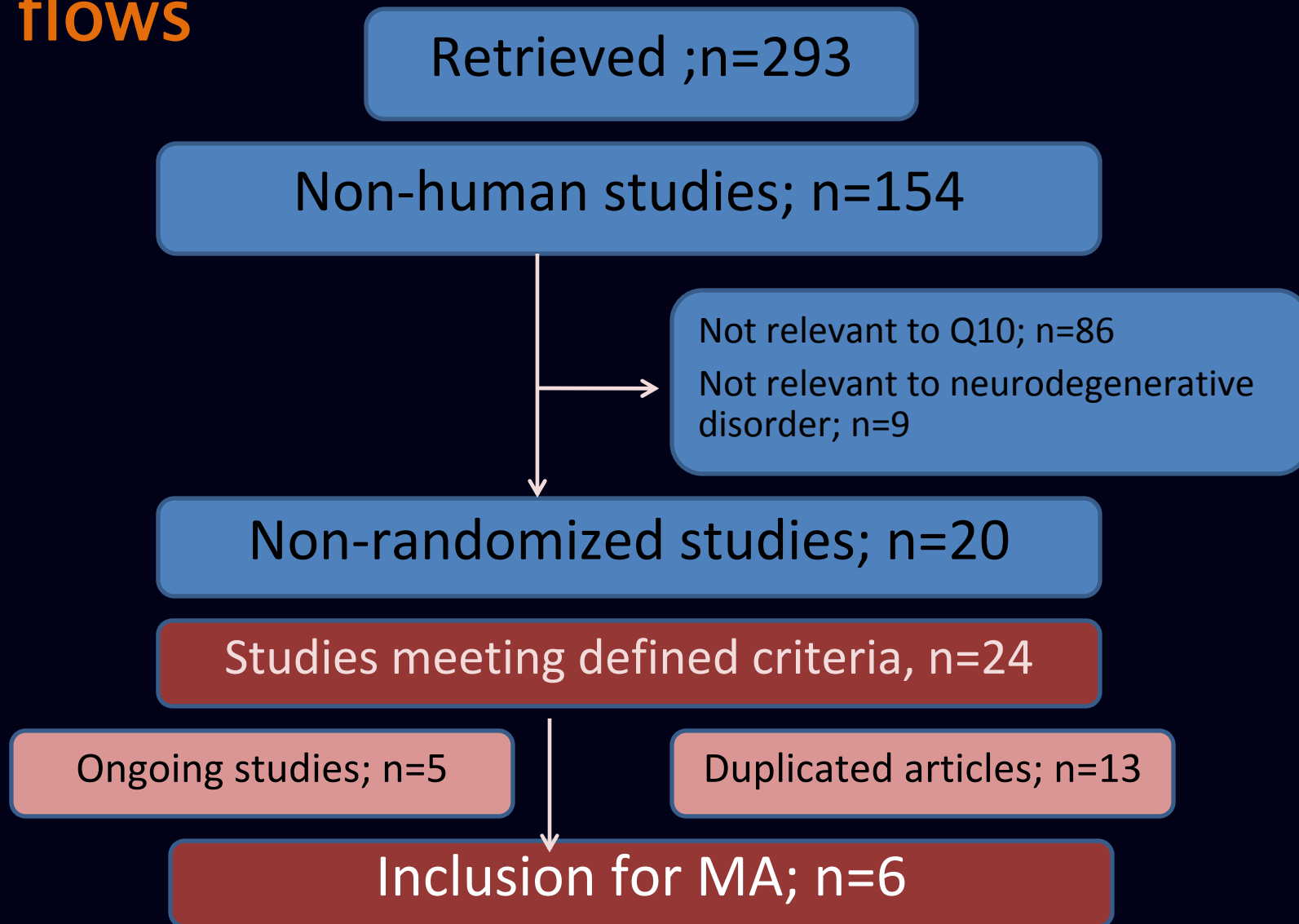


- TOTAL UNIFIED HUNTINGTON'S DISEASE RATING SCALE (TOTAL UHDRS)

- HOEHN & YAHR STAGING OF PARKINSON'S DISEASES

I	II	III	IV	V
mild	Mild movement dysfunction	Moderate motor dysfunction	Severe dysfunction	Absolute disability

Trial flows



Studies characteristics

Study/ Year	Population	Co Q10 (mg/day)	Duration	Outcome
Shults 2002	Early PD	300, 600,1200	64 wks	Total UPDRS, UPDRS II/III, Schwab-England, Hoehn-Yahr Scale
NINDS 2007	Early PD	2400	48 wks	Total UPDRS, UPDRS I, UPDRS II, UPDRS III, Schwab-England Hoeh-Yahr
Muller 2003	Early PD	360	4 wks	Total UPDRS, UPDRS III

Studies characteristics

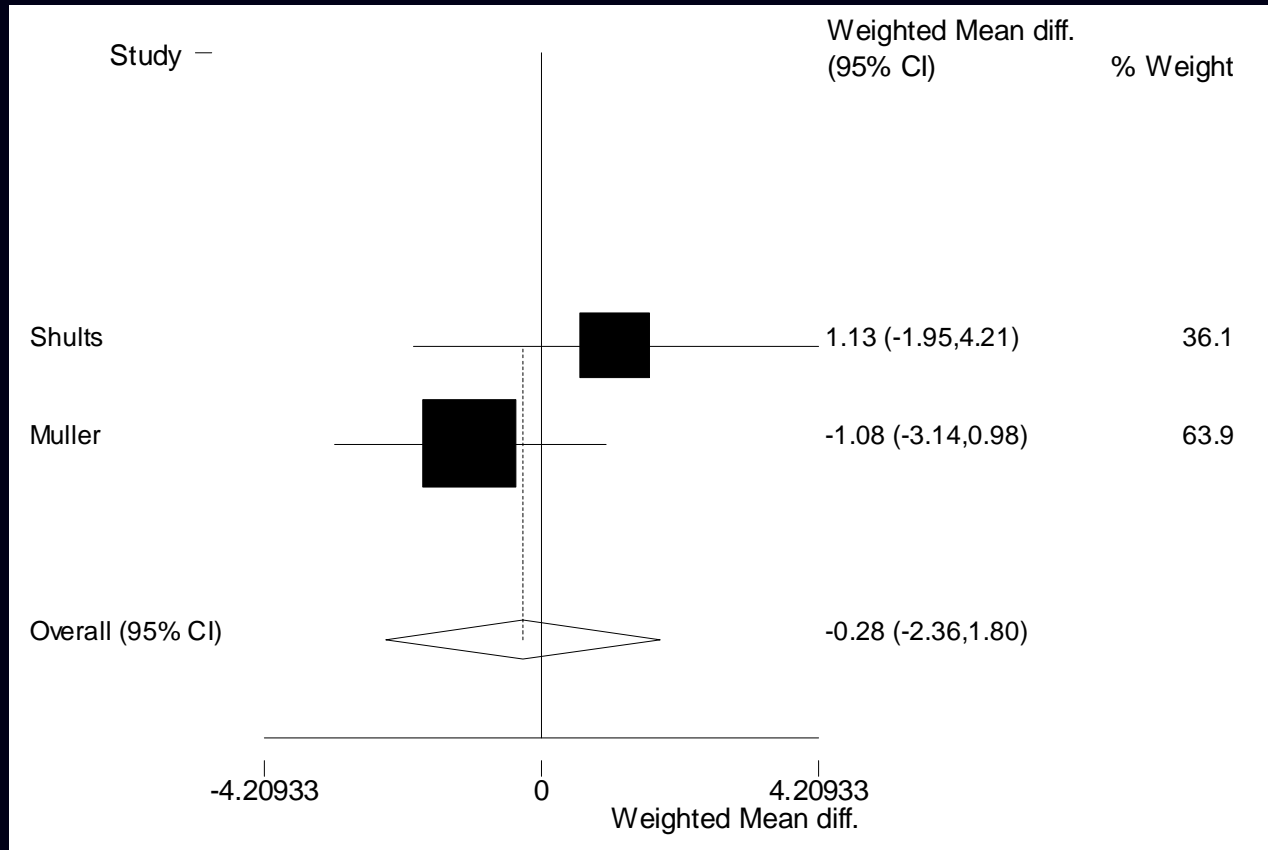
Study/Year	Population	Co Q10 (mg/day)	Duration	Outcome
Storch 2007	Midstage PD	300	12 wks	Total UPDRS, UPDRS II/III , Schwab-Eng, Hoeh-Yahr
Stamelou 2008	PSP	5 mg/kg/day	6 wks	UPDRS II, UPDRS III, PSP-RS
The Huntington Study Group 2001	Early HD	600	30 months	TFC, UHDRS

RESULTS



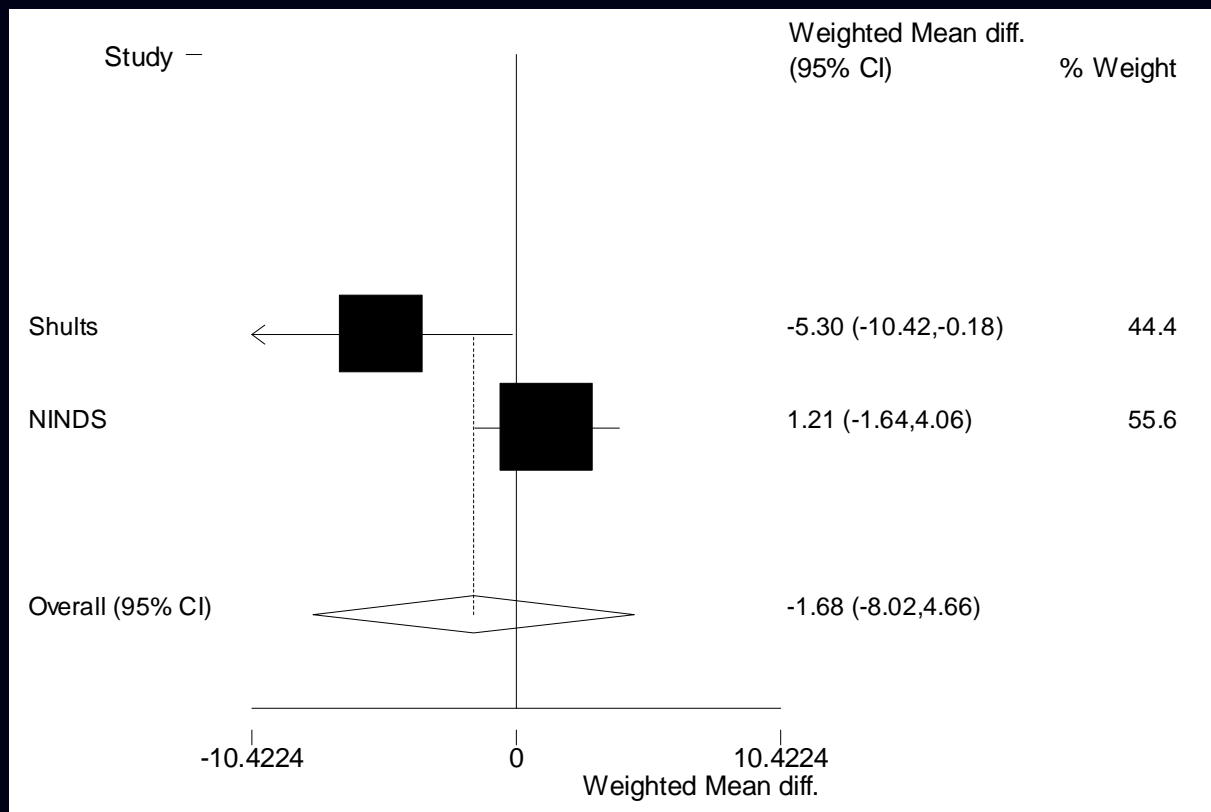
Pooled Outcomes	Short term (< 3 months)		Long term (≥12 months)	
	< 500 mg	>1000 mg	< 500 mg	>1000 mg
Total UPDRS	Shults, 2002 Muller, 2003	Shults, 2002	Shults, 2002	Shults, 2002 NINDS, 2007
UPDRS1	Shults, 2002	Shults, 2002	Shults, 2002	Shults, 2002 NINDS, 2007
UPDRS2	Shults, 2002 Stamelou, 2008	Shults, 2002	Shults, 2002	Shults, 2002 NINDS, 2007
UPDRS3	Shults, 2002 Muller, 2003 Stamelou, 2008	Shults, 2002	Shults, 2002	Shults, 2002 NINDS, 2007

Low dose supplementation in short term



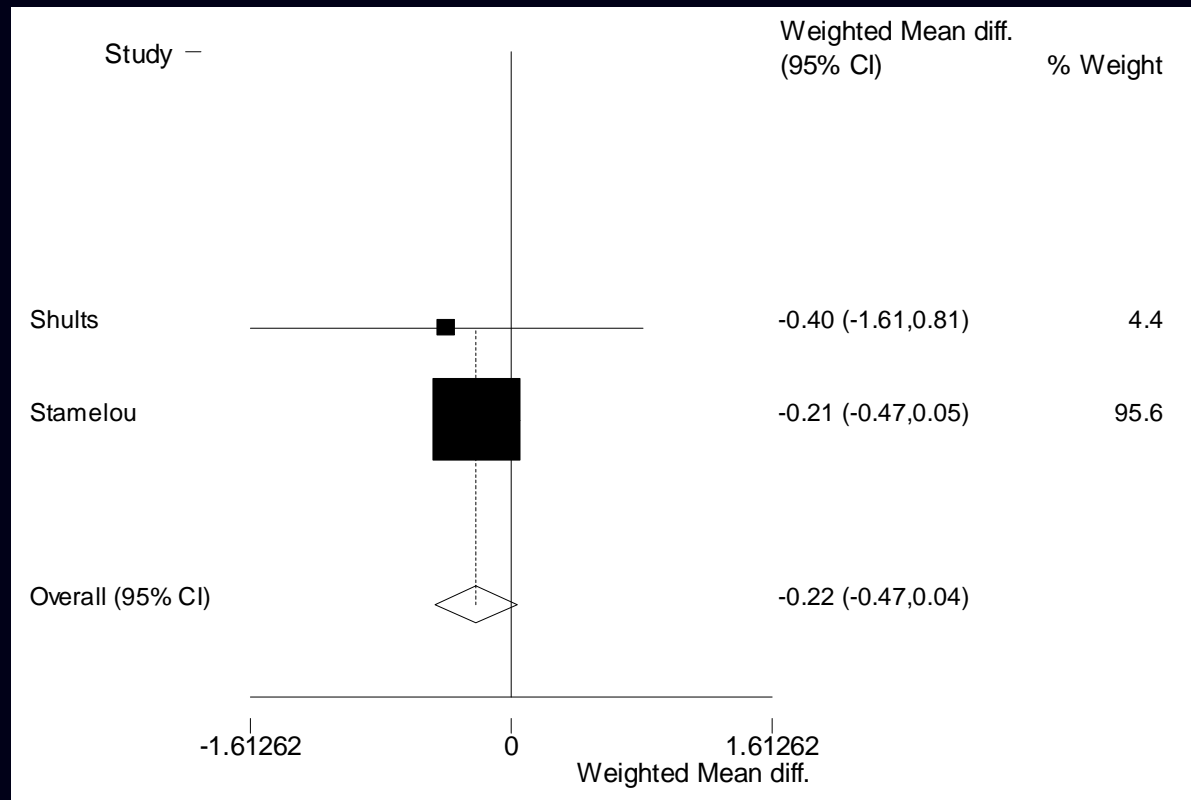
WMD = -0.28 (95% CI: -2.36 to 1.80, $p= 0.790$)

High dose supplementation in long term



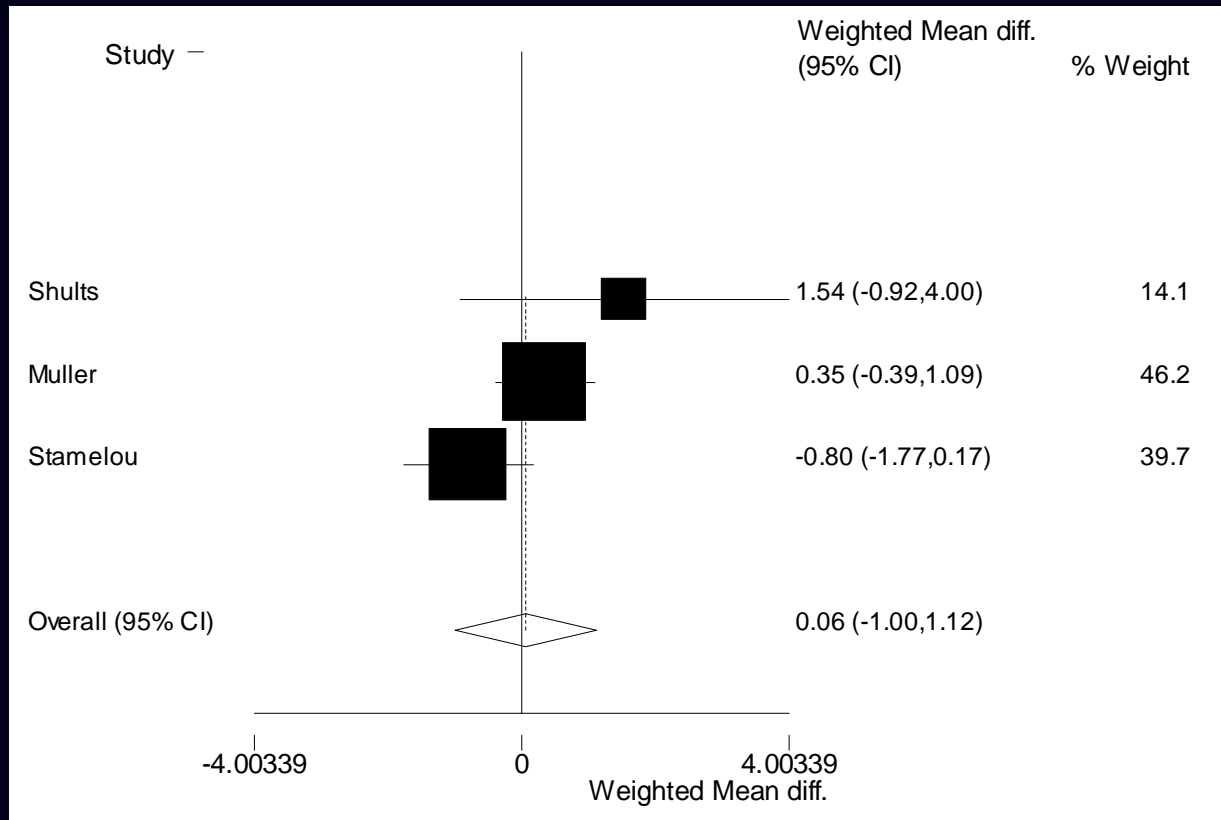
WMD = - 1.68 (95% CI: -8.02 to 4.66, $P = 0.603$)

Low dose supplementation in short term



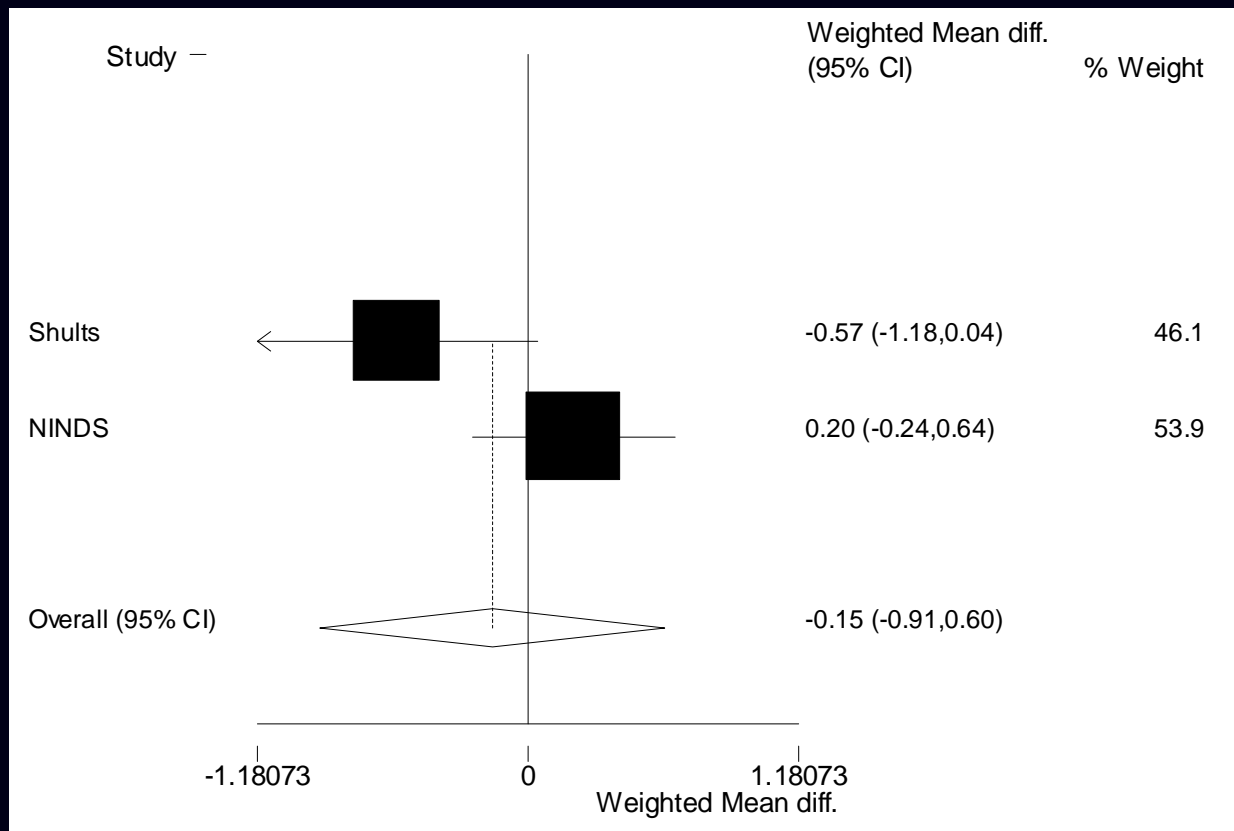
WMD = -0.22 (95% CI: -0.47 to 0.04, $P = 0.094$)

Low dose supplementation in short term



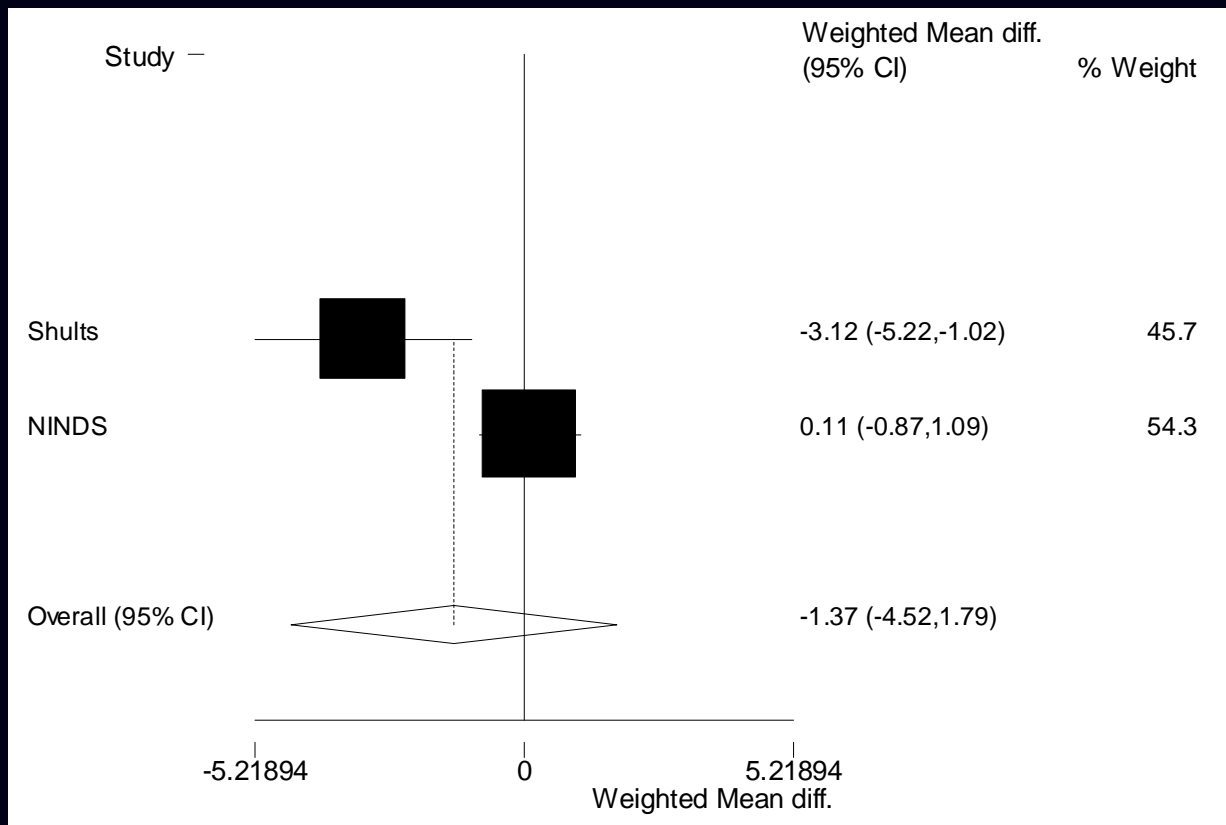
WMD = 0.06 (95% CI: -1.00 to 1.12, P = 0.910)

High dose supplementation in long term



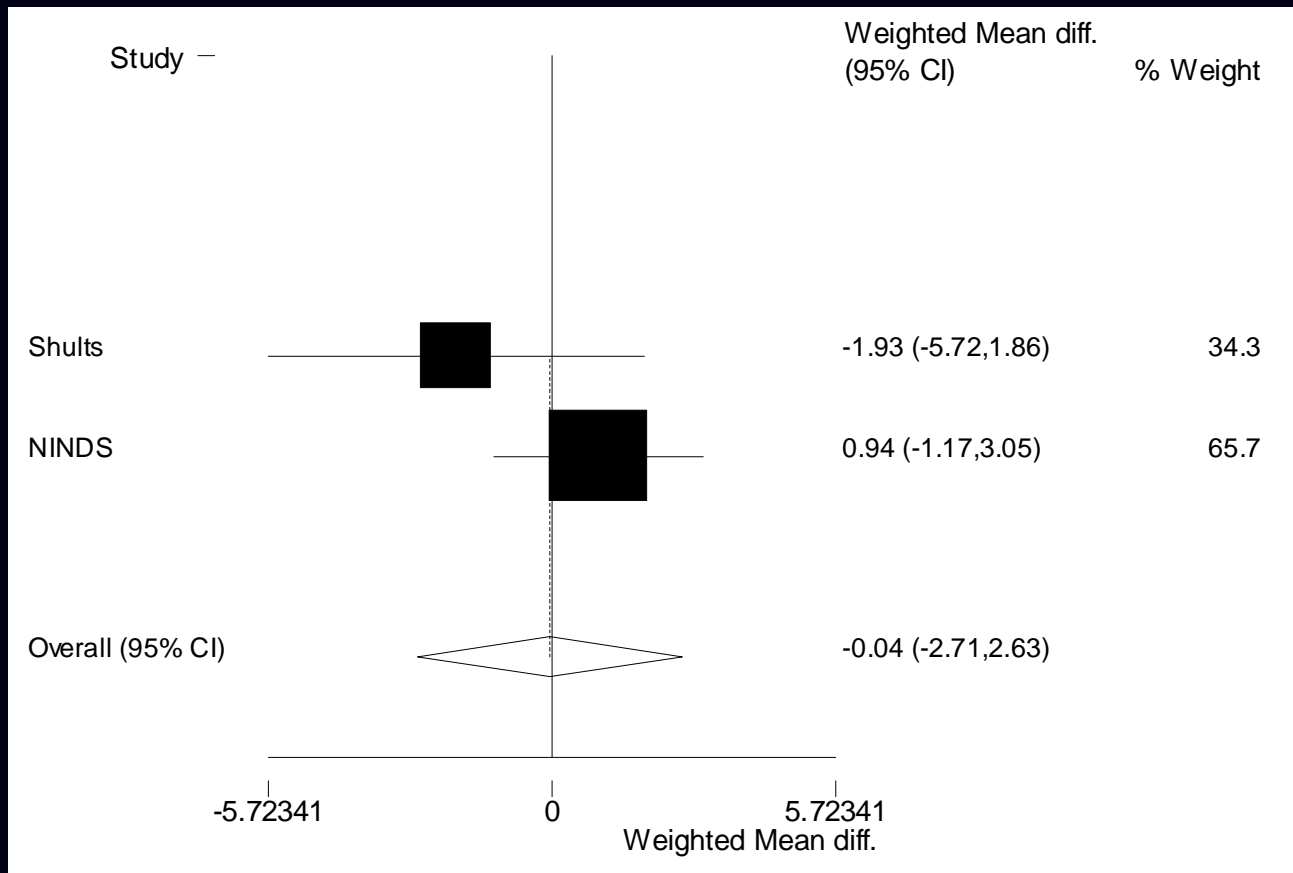
WMD = - 0.15 (95% CI: -0.91 to 0.60, P = 0.686)

High dose supplementation in long term



WMD = - 1.37 (95% CI: -4.52 to 1.79, P = 0.396)

High dose supplementation in long term



WMD = -0.04 (95% CI: -2.71 to 2.63, P = 0.974)

RESULTS :

Hoehn & Yahr staging of Parkinson's disease

Pooled analysis of long term supplementation
of high dose coenzyme Q10

WMD = 0.06 (95%CI; -0.09,0.21)

SCHWAB & ENGLAND SCALE

Pooled analysis of long term supplementation
of high dose coenzyme Q10

WMD = 1.80 (95%CI; -3.12,6.73)

- Different dimension of outcome measurement among studies (types of clinical outcome measures)
- Different range of coenzyme Q10 dosing among pooled studies
- Timing for outcome measurement varies among each study
- Some studies included in MA had quite a small sample size (10–20 patients/arm)
- Majority of studies included in MA did not provide sufficient details of co-intervention
- Outcomes were reported as changes in scoring, no explanation in term of clinical improvement

CONCLUSION

- Current evidence show that coenzyme Q10 supplementation could not slow progression of diseases among patients with neurodegenerative disorders; Parkinson's disease, Progressive supranuclear palsy and Huntington's disease albeit the antiparkinsonian agents are optimized
- Compared to standard treatment, supplementation with coenzyme Q10 do not cause significant adverse events
- Larger number of studies may be necessary for future MA

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Thanks for all your attendance

Q

A

All questions welcomed