Cost-Effectiveness of Chondroitin Sulfate Plus Glucosamine Versus Celecoxib for Moderate to Severe Knee Osteoarthritis

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Background

- Knee Osteoarthritis (KOA) contributes to significant morbidity and healthcare expenditure in the United States.
- Nonsteroidal anti-inflammatory drug (NSAID) Celecoxib is frequently prescribed but carries notable gastrointestinal and cardiovascular risks.
- Non-FDA-approved supplements such as Chondroitin Sulfate plus Glucosamine (CS + GH) are favored by patients as alternatives to NSAIDs despite their debated effectiveness and considerable out-of-pocket costs.
- There is an increasing need for careful evaluation of the economic and therapeutic outcomes of treatment options in KOA.

Objective

- To compare the cost-effectiveness of CS + GH to Celecoxib for moderate to severe KOA from the patients' perspective**.**

Methods

- We used a decision tree model (*TreeAge Pro Healthcare 2023*) over a 6-month horizon to compare CS + GH (400mg CS and 500mg GH thrice daily) to Celecoxib (200mg daily).
- Effectiveness was measured in Quality-Adjusted Life Years (QALYs) gained, with a $150,000 Willingness-To-Pay (WTP) threshold.
- Model inputs for drugs, adverse events, and indirect healthcare costs (converted to 2023 USD) were obtained from published literature (Redbook, MEPS, AJMC, ACR/ARP, GoodRx).
- Decision tree path probabilities and health utility values were obtained from the MOVES (Multicentre Osteoarthritis intervention trial with SYSADOA) trial data.
- We assumed a linear health utility change, with 25% and 50% reductions for serious adverse events and treatment non-responders respectively.
- We conducted one-way, two-way, and probabilistic sensitivity analyses.

Results

Table 1: Base case results for cost-effectiveness analysis

Study Comparator	Total Cost	Total QALYs gained[a]	Incremental Cost	Incremental QALYs gained	ICER (Cost/QALY gained)
Celecoxib	$1,550	0.04			$32,408
CS + GH	$1,348	0.03	$202	0.01	

*a:*All QALYs are based on health utilities estimated using EQ-VAS (EuroQol Visual Analogue Scale).

Celecoxib was more cost-effective compared to Chondroitin Sulfate plus Glucosamine for short-term management of moderate to severe knee osteoarthritis

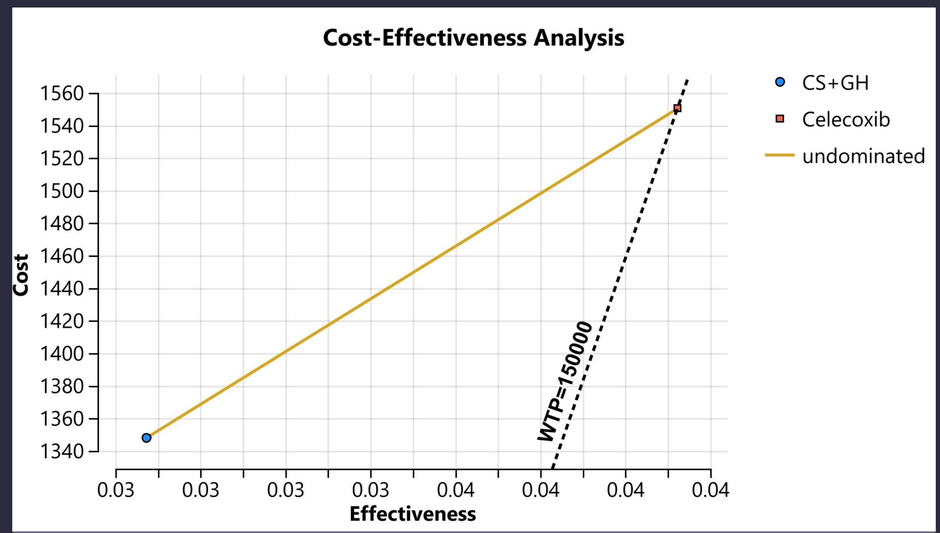

Figure 1: Graph comparing the cost and effectiveness of CS +GH vs. Celecoxib**.**

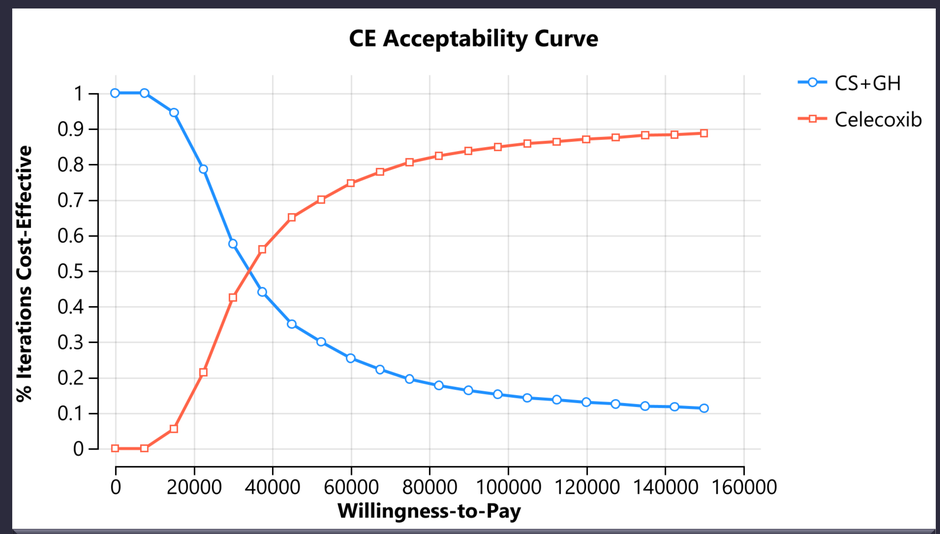

Figure 2: Graph depicting the cost-effectiveness acceptability of CS + GH vs. Celecoxib at different Willingness-to-pay (WTP) thresholds.

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Results (contd.)

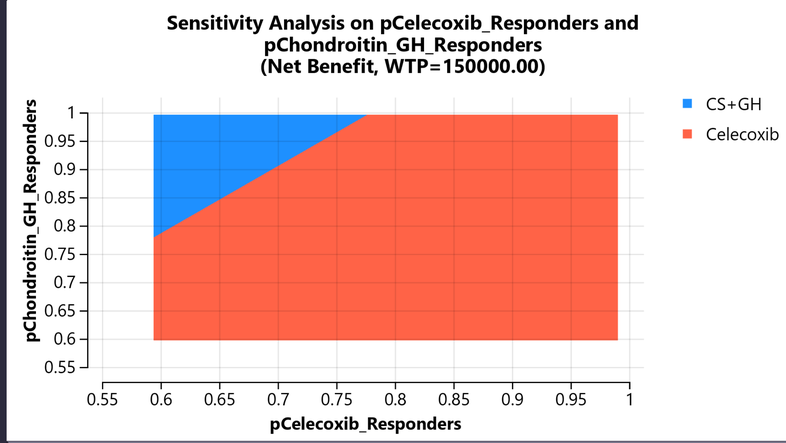

Figure 3: Two-way sensitivity analysis depicting variability in the cost-effectiveness of CS + GH vs. Celecoxib with changes in response rates to both treatments, respectively.

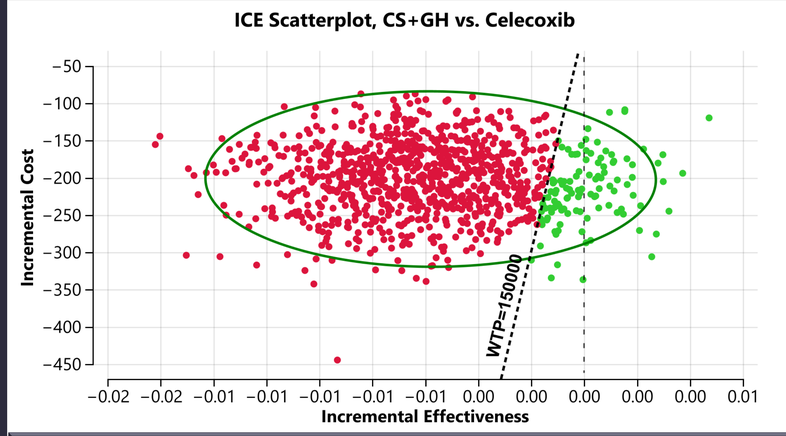

Figure 4: Probabilistic sensitivity analysis scatter plot depicting variability in the incremental cost and effectiveness estimates for CS + GH vs. Celecoxib within a 95% confidence interval.

Conclusion

- From the patients' perspective, Celecoxib is likely more cost-effective compared to CS + GH for short-term management of moderate to severe KOA.

Limitations and Future Directions

- The brief six-month study may not reflect long-term outcomes. Future research should extend the study length.
- Future research on knee osteoarthritis should be more inclusive, validate clinical trial results with real-world evidence, and include data on medication adherence to better reflect actual treatment scenarios.

Key reference

- Hochberg, M. C., Martel-Pelletier, J., Monfort, J., Möller, I., Castillo, J. R., Arden, N., Berenbaum, F., Blanco, F. J., Conaghan, P. G., Doménech, G., Henrotin, Y., Pap, T., Richette, P., Sawitzke, A., du Souich, P., & Pelletier, J.-P. (2016). Combined chondroitin sulfate and glucosamine for painful knee osteoarthritis: A multicentre, randomised, double-blind, non-inferiority trial versus celecoxib. *Annals of the Rheumatic Diseases*, *75*(1), 37–44. https://doi.org/10.1136/annrheumdis-2014-206792.