Evidence Analysis Library Research Project

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9-1-2012

STEP 1:

Appendix 2: The PICO Format

Population	Intervention	Comparison	Outcomes
Patients with Type 2 Diabetes Mellitus	Cinnamon supplementation	No cinnamon supplementation	Reduce blood glucose levels and/or HbA1c

STEP 2:

Appendix 3: Search Plan & Results

Question:	What evidence supports a relationship between cinnamon supplementation and reduced blood glucose levels/HbA1c in type 2 diabetics?
Date of Literature Review:	August 2012
Inclusion Criteria:	• **Age:** > 18 years of age, no upper limit • **Setting:** Outpatient • **Health Status:** All • **Nutrition Related Problem/Condition:** Type 2 diabetes • **Study Design Preference:** Randomized Controlled Trial, Cohort Study • **Size of Study Groups:** Must have more than 60 patients • **Study Drop Out Rate:** < 20% • **Year Range:** 2007-2012 • **Authorship:** The most recent primary research article should be used if the author or content is the same. • **Language:** Articles only published in English
Exclusion Criteria:	• **Age:** < 18 years of age • **Setting:** Inpatient • **Health Status:** Critically ill • **Nutrition Related Problem/Condition:** Type 1 diabetes, allergies to cinnamon, herbal medicine, serious pathology • **Study Design Preference:** Non-Randomized Controlled Trial, Case-Control Study, Non-Controlled Trial, Meta-analysis or Systematic Reviews • **Size of Study Groups:** <60 patients • **Study Drop Out Rate:** > 20% • **Year Range:** Prior to 2007 • **Authorship:** Studies conducted by the same author with similar data and content • **Language:** Articles not published in English
Search Terms: Search Vocabulary	**Health Condition:** Type 2 diabetes **Intervention:** Cinnamon supplementation **Type of Study Design**: Randomized Controlled Trial, Cohort
Electronic Databases:	• **Database:** PubMed • **Search Terms:** (cinnamon) and (type 2 diabetes) • **Hits:** 41 • **Articles to Review:** 4 • **Total articles identified to review from electronic databases:** 41
Inclusion List:	Crawford P. Effectiveness of cinnamon for lowering hemoglobin A1c in patients with type 2 diabetes: a randomized, controlled trial. *J Am Board Fam Med* 2009;22(5):507-12.

<table>
<tr><td></td><td>Lu, T., Sheng, H., Wu, J., Cheng, Y., Zhu, J., & Chen, Y. (2012) Cinnamon extract improves fasting blood glucose and glycosylated hemoglobin level in Chinese patients with type 2 diabetes. Nutrition Research. 32: 408-412. doi:10.1016/j.nutres.2012.05.003.</td></tr>
<tr><td>List of Articles Included from Handsearch or Other Means:</td><td>No other articles identified</td></tr>
<tr><td>List of Excluded Articles with Reason:</td><td>
<table>
<tr><th>Excluded Articles</th><th>Reason for Exclusion</th></tr>
<tr><td>Qin B, Panickar KS, Anderson RA. (2010). Cinnamon: potential role in the prevention of insulin resistance, metabolic syndrome, and type 2 diabetes. J Diabetes Sci Technol. 1;4(3):685-93.</td><td>Too broad, not focused on type 2 diabetes</td></tr>
<tr><td>Baker WL, Gutierrez-Williams G, White CM, Kluger J, Coleman CL. (2008). Effect of cinnamon on glucose control and lipid parameters. Diabetes Care. 31(1):41-3.</td><td>Type 1 and Type 2 diabetics included</td></tr>
</table>
</td></tr>
<tr><td>Summary of Articles Identified to Review</td><td>

Number of Included Primary Research Articles Identified from all sources: 28
Number of Included Review Articles Identified from all sources: 13
Total Number of Included Articles: 2
Number of Articles Considered but Excluded: 2
Total Number of Articles Considered: 4

</td></tr>
</table>

Step 3:

Appendix 7 & 8: Critically Appraise Each Article

Academy of Nutrition and Dietetics
Evidence Analysis Library® Worksheet Template and
Quality Criteria Checklist: Primary Research

Citation	Crawford P. (2009). Effectiveness of cinnamon for lowering hemoglobin A1c in patients with type 2 diabetes: a randomized, controlled trial. J Am Board Fam Med. 22(5):507-12.
Study Design	Randomized Control Trial
Class	A
Quality Rating	☒ + (Positive) ☐ - (Negative) ☐ ⊘ (Neutral)
Research Purpose	The purpose of the study was to determine if cinnamon had a lowering capability on HbA1c levels in type 2 diabetics.
Inclusion Criteria	• < 18 years of age • Type 1 diabetics, allergies to cinnamon, critically ill, or have serious pathology, hospitalized • HgA1c > 7.0% • Non-Randomzed Controlled Trial, Case Control Study, Non-Controlled Trial, Meta-analysis or Systematic Review • Research before 2007 • < 60 patients participating • 20% drop out rate
Exclusion Criteria	• < 18 years of age • Type 1 diabetics, allergies to cinnamon, critically ill, or have serious pathology, hospitalized • Non-Randomzed Controlled Trial, Case Control Study, Non-Controlled Trial, Meta-analysis or Systematic Review • Research before 2007 • < 60 patients participating • 20% drop out rate
Description of Study Protocol	Recruitment: Recruited from 96th Medical Group, Eglin Air Force Base, and from phone calls to volunteers with known diabetics. Design: Randomized: Diabetic patients with a HbA1C of >7.0% in the past 6 months, and were not pregnant, < 18 years of age, or have an allergy to cinnamon were recruited for study. Patients were randomized by blocking in groups of 10. Half of each block of 10 was categorized into the "treatment" group and th eother half into the "control" group. Group allocation was blinded, but participants and investigators were not blinded. Both groups of patients had a serum, nonfasting

	HbA1c drawn on day 0, and again at their follow up on day 90 to 95. Blinding used (if applicable): Laboratory was blinded – determining group allocation of "control" group or "treatment" group. Intervention (if applicable): For the intervention, group receiving cinnamon received 180 capsules (500 mg each) of Cinnamomum cassia. This equated to taking 2 capsules daily with food, in addition to their normal medications. The usual care group was to maintain their normal medicines. Statistical Analysis: Primary outcome: used an unpaired 2-sample t test Intention to treat analysis: carrying-forward method used by carrying forward the last known value for HbA1C for noncmopliance and withdrawals causing missing data. Power of 0.80 determination was calculated by sample size of 126 and alpha=0.05. A 0.5% lowering of HbA1c would be considered clinically significant.
Data Collection Summary	Timing of Measurements: Serum, nonfasting HbA1c tested at day 0, and tested at the followup on day 90-95. Dependent Variables: Decrease in HbA1c Independent Variables: Cinnamon supplementation of 1 g/day Control Variables:
Description of Actual Data Sample	Initial: 109 (64 Males 45 Females) Attrition (final N): 89, 82% attrition Age: 49-70 Ethnicity: Caucasian (83), African American (16), Latino (4), Asian (6) Other relevant demographics: Anthropometrics: No specific anthropometrics Location: Eglin Air Force Base, Florida
Summary of Results	Key Findings: Baseline HbA1C Final HbA1c Treatment Group 8.47 ± 1.8 7.64 ± 1.7 -0.83 (95% CI, 0.46-1.20) Control Group 8.28 ± 1.3 7.91 ± 1.5 -0.37 (95% CI, 0.15-0.59) When intention to treat analysis was performed by carrying forward the last

	known value for HbA1c for the initial 109 patients, it was determined that cinnamon receiving diabetics reduced their HbA1c levels. The treatment group had a basline HbA1c of 8.47 ± 1.8 and final HbA1c of 7.64 ± 1.7, a reduction of 0.83%, (p=<.001). In comparison to usual care group, which had a baseline HbA1c of 8.28 ± 1.3 and final HbA1c of 7.91 ± 1.5, a reduction of 0.37%, (p=0.16). Even when analysis involved only the 89 patients who completed the study, the results were still similar. Other Findings:
Author Conclusion	In 90 days, cinnamon supplementation of 1 g/day lowers HbA1c by 0.83% (CI, 0.46-1.20) in poorly controlled type 2 diabetics. Supplementation of cinnamon may be a safe way to potentially lower HbA1c in type 2 diabetics who currently have a HbA1c >7.0%.
Reviewer Comments	*The study is strengthened by its longer duration, giving appropriate time to determine if cinnamon supplementation is effective. However, a placebo was not used. The small group size and limitation to one geographical location affect the study's validity and generalizability.*
Funding Source	United States Air Fore Surgeon General's Office for Population Health Research

Quality Criteria Checklist: Primary Research

Symbols Used	*Explanation*
+	***Positive –*** *Indicates that the report has clearly addressed issues of inclusion/exclusion, bias, generalizability, and data collection and analysis*
--	***Negative –*** *Indicates that these issues have not been adequately addressed.*
⊘	***Neutral*** *– indicates that the report is neither exceptionally strong nor exceptionally week*

Select a rating from the drop-down menu ↓

Relevance Questions		
1. Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (NA for some Epi studies)	1	Yes
2. Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	2	Yes
3. Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to dietetics practice?	3	Yes

4. Is the intervention or procedure feasible? (NA for some epidemiological studies)	4	Yes
If the answers to all of the above relevance questions are "Yes," the report is eligible for designation with a plus (+) on the Evidence Quality Worksheet, depending on answers to the following validity questions.		
Validity Questions		
1. Was the <u>research question</u> clearly stated?	1	Yes
1.1. Was the specific intervention(s) or procedure (independent variable(s)) identified?	1.1	Yes
1.2. Was the outcome(s) (dependent variable(s)) clearly indicated?	1.2	Yes
1.3. Were the target population and setting specified?	1.3	Yes
2. Was the <u>selection</u> of study subjects/patients free from bias?	2	Yes
2.1. Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	2.1	Yes
2.2. Were criteria applied equally to all study groups?	2.2	Yes
2.3. Were health, demographics, and other characteristics of subjects described?	2.3	Yes
2.4. Were the subjects/patients a representative sample of the relevant population?	2.4	Yes
3. Were <u>study groups comparable</u>?	3	Yes
3.1. Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	3.1	Yes
3.2. Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	3.2	Yes
3.3. Were concurrent controls used? (Concurrent preferred over historical controls.)	3.3	Yes
3.4. If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	3.4	N/A
3.5. If case control study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	3.5	N/A
3.6. If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	3.6	N/A

4. Was method of handling <u>withdrawals</u> described?	4	Yes
4.1. Were follow up methods described and the same for all groups?	4.1	Yes
4.2. Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	4.2	Yes
4.3. Were all enrolled subjects/patients (in the original sample) accounted for?	4.3	Yes
4.4. Were reasons for withdrawals similar across groups	4.4	Unclear
4.5. If diagnostic test, was decision to perform reference test not dependent on results of test under study?	4.5	N/A
5. Was <u>blinding</u> used to prevent introduction of bias?	5	Yes
5.1. In intervention study, were subjects, clinicians/practitioners, and investigators		

blinded to treatment group, as appropriate? 5.2. Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.) 5.3. In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded? 5.4. In case control study, was case definition explicit and case ascertainment not influenced by exposure status? 5.5. In diagnostic study, were test results blinded to patient history and other test results?	5.1 5.2 5.3 5.4 5.5	Yes No N/A N/A N/A
6. Were <u>intervention</u>/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were <u>intervening factors</u> described? 6.1. In RCT or other intervention trial, were protocols described for all regimens studied? 6.2. In observational study, were interventions, study settings, and clinicians/provider described? 6.3. Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect? 6.4. Was the amount of exposure and, if relevant, subject/patient compliance measured? 6.5. Were co-interventions (e.g., ancillary treatments, other therapies) described? 6.6. Were extra or unplanned treatments described? 6.7. Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups? 6.8. In diagnostic study, were details of test administration and replication sufficient?	6 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8	Yes Yes Yes Yes Yes No No N/A N/A
7. Were <u>outcomes</u> clearly defined and the <u>measurements valid and reliable</u>? 7.1. Were primary and secondary endpoints described and relevant to the question? 7.2. Were nutrition measures appropriate to question and outcomes of concern? 7.3. Was the period of follow-up long enough for important outcome(s) to occur? 7.4. Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures? 7.5. Was the measurement of effect at an appropriate level of precision? 7.6. Were other factors accounted for (measured) that could affect outcomes? 7.7. Were the measurements conducted consistently across groups?	7 7.1 7.2 7.3 7.4 7.5 7.6 7.7	Yes Yes Yes Yes Yes Yes Yes Yes

8. Was the <u>statistical analysis</u> appropriate for the study design and type of outcome indicators? 8.1. Were statistical analyses adequately described the results reported appropriately? 8.2. Were correct statistical tests used and assumptions of test not violated? 8.3. Were statistics reported with levels of significance and/or confidence intervals?	8 8.1 8.2 8.3	Yes Yes Yes Yes

8.4. Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	8.4	Yes
8.5. Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	8.5	Yes
8.6. Was clinical significance as well as statistical significance reported?	8.6	Yes
8.7. If negative findings, was a power calculation reported to address type 2 error?	8.7	N/A
9. **Are <u>conclusions supported by results</u> with biases and limitations taken into consideration?**	9	Yes
9.1. Is there a discussion of findings?	9.1	Yes
9.2. Are biases and study limitations identified and discussed?	9.2	Yes
10. Is bias due to study's <u>funding or sponsorship</u> unlikely?	10	Yes
10.1. Were sources of funding and investigators' affiliations described?	10.1	Yes
10.2. Was there no apparent conflict of interest?	10.2	Yes

MINUS/NEGATIVE (-)

If most (six or more) of the answers to the above validity questions are "No," the report should be designated with a minus (-) symbol on the Evidence Worksheet.

NEUTRAL (∅)

If the answers to validity criteria questions 2, 3, 6, and 7 do not indicate that the study is exceptionally strong, the report should be designated with a neutral (∅) symbol on the Evidence Worksheet.

PLUS/POSITIVE (+)

If most of the answers to the above validity questions are "Yes" (including criteria 2, 3, 6, 7 and at least one additional "Yes"), the report should be designated with a plus symbol (+) on the Evidence Worksheet.

Step 3 (Continued):

Appendix 7 & 8: Critically Appraise Each Article

Academy of Nutrition and Dietetics
Evidence Analysis Library® Worksheet Template and
Quality Criteria Checklist: Primary Research

Citation	Lu, T., Sheng, H., Wu, J., Cheng, Y., Zhu, J., & Chen, Y. (2012) Cinnamon extract improves fasting blood glucose and glycosylated hemoglobin level in Chinese patients with type 2 diabetes. Nutrition Research. 32: 408-412. doi:10.1016/j.nutres.2012.05.003.
Study Design	Randomized, double blind clinical study
Class	A
Quality Rating	☒ + (Positive) ☐ - (Negative) ☐ ⊘ (Neutral)
Research Purpose	Purpose is to analyze the affect of cinnamon extract on the levels of fasting blood glucose (FBG) and HbA1c in Chinese patients with type 2 diabetes.
Inclusion Criteria	• Type 2 diabetes • Medication: gliclazide to treat diabetes (Diamicron, 30mg per tablet) • HbA1c greater than 7.0% • Fasting Blood Glucose (FBG) greater than 8.0mmol/L
Exclusion Criteria	• Type 1 diabetes • Use of insulin • Serious pathology including medical problems in major organs such as the heart, lung, kidney, • Concomitant medication (except for gliclazide) • Herbal medicines • Allergies to cinnamon
Description of Study Protocol	Recruitment: Outpatients of Xuhui Central Hospital Design: Randomized Blinding used (if applicable): Double-Blind. Neither physician nor patient knew content of ingested tablet Intervention (if applicable): Placebo- 2 control tablets a day, same size, shape, and color as the cinnamon-containing tablets Low Dose- 2 cinnamon tablets (60mg cinnamon extract per tablet) High Dose- 6 cinnamon tablets (60mg cinnamon extract per tablet) Statistical Analysis: Software R 2.11.0 was used on all data Paired t-test

	Value of 5% was used to define significance (P=.05) Duration: 3 month study period (average 91 days)
Data Collection Summary	Timing of Measurements: Blood samples taken in the morning after 10 hour fast Blood samples were taken at the beginning of treatment (pretreatment) and at the end of the 3 months (post treatment) Dependent Variables: Fasting Blood Glucose (FBG) HbA1c Independent Variables: Cinnamon extract Control Variables:
Description of Actual Data Sample	Initial: 69 (25 Males 44 Females) Attrition (final N): 66 (25 Males 41 Females) Age: Placebo group: 60 ±5.9 Low dose: 62.4 ± 7.9 High dose: 58.9 ± 6.4 Weighted Average Age 60.4 Ethnicity: Chinese Other relevant demographics: Anthropometrics: Irrelevant (did not report) Location: China (outpatient of Xuhui Central Hospital)
Summary of Results	Key Findings: HbA1c (%) Placebo Low dose (120mg/d) High dose (360mg/d) Pre 8.93± 1.14 8.90± 1.24 8.92± 1.35 Post 8.93± 1.04 8.23± 0.99 8.00± 1.00 Δ (95 % CI) 0.00 (-0.61 to 0.61) -0.67 (-1.09 to -0.25) -0.93 (-1.38 to -0.47) Fasting glucose (mmol/L)

	Pre	8.92 ± 1.21	9.00± 1.23	11.21± 2.21
	Post	8.71 ± 2.01	7.99± 1.05	9.59 ±1.66
	Δ (95 % CI)	-0.22 (-1.34 to 0.91)	-1.02 (-1.61 to -0.42)	-1.62 (-2.32 to -0.93)
	Triglyceride (mmol/L)			
	Pre	1.68 ± 0.67	2.93± 2.08	1.74± 1.05
	Post	1.82 ± 0.88	2.15± 1.19	1.84± 1.16
	Δ (95 % CI)	0.15 (-0.19 to 0.49)	-0.78 (-1.32 to - 0.23)	0.10 (-0.20 to 0.41)
	HbA1c and FBG levels were significantly reduced in post treatment in low and high dose groups. HbA1c in low dose group had an average reduction of 0.67% (p=.003). HbA1c in the high dose group had an average reduction of 0.92% (p=.0004). FBG in the low dose group had an average reduction of 1.01 mmol/L (p=.002). FBG in the high dose group had an average reduction of 1.62 mmol/L (p=.00008). Triglyceride levels were significantly reduced in the low dose group (p= .007). Other Findings: Levels of total cholesterol (p=.042) and alanine aminotransferase (p=.028) were slightly increased in the placebo group.			
Author Conclusion	Data indicates that supplementation of cinnamon extract at both 120 and 360 mg/d could significantly reduce the levels of HbA1c and FBG in type 2 diabetes patients. A low dose (120 mg/d) of cinnamon appears to have an effect in reducing triglyceride levels. Cinnamon is able to improve blood glucose control in Chinese patients with type 2 diabetes.			
Reviewer Comments	*Methodology was very controlled and greatly strengthened the study.*			
Funding Source	Research grants: Chinese Academy of Sciences National Natural Science Foundation of China			

Quality Criteria Checklist: Primary Research

Symbols Used	*Explanation*
+	***Positive –*** *Indicates that the report has clearly addressed issues of inclusion/exclusion, bias, generalizability, and data collection and analysis*
--	***Negative –*** *Indicates that these issues have not been adequately addressed.*
⊘	***Neutral*** *– indicates that the report is neither exceptionally strong nor exceptionally week*

Select a rating from the drop-down menu ↓

Relevance Questions		
5. Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (NA for some Epi studies)	1	Yes
6. Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	2	Yes
7. Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to dietetics practice?	3	Yes
8. Is the intervention or procedure feasible? (NA for some epidemiological studies)	4	Yes
If the answers to all of the above relevance questions are "Yes," the report is eligible for designation with a plus (+) on the Evidence Quality Worksheet, depending on answers to the following validity questions.		
Validity Questions		
11. Was the <u>research question</u> clearly stated?	1	Yes
11.1. Was the specific intervention(s) or procedure (independent variable(s)) identified?	1.1	Yes
11.2. Was the outcome(s) (dependent variable(s)) clearly indicated?	1.2	Yes
11.3. Were the target population and setting specified?	1.3	Yes
12. Was the <u>selection</u> of study subjects/patients free from bias?	2	Yes
12.1. Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	2.1	Yes
12.2. Were criteria applied equally to all study groups?	2.2	Yes
12.3. Were health, demographics, and other characteristics of subjects described?	2.3	Yes
12.4. Were the subjects/patients a representative sample of the relevant population?	2.4	Yes
13. Were <u>study groups comparable</u>?	3	Yes
13.1. Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	3.1	Yes
13.2. Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	3.2	Yes
13.3. Were concurrent controls used? (Concurrent preferred over historical controls.)	3.3	N/A
13.4. If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	3.4	N/A
13.5. If case control study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-	3.5	N/A

sectional studies.) 13.6. If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	3.6	N/A

14. Was method of handling <u>withdrawals</u> described?	4	Yes
14.1. Were follow up methods described and the same for all groups?	4.1	Yes
14.2. Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	4.2	Yes
14.3. Were all enrolled subjects/patients (in the original sample) accounted for?	4.3	Yes
14.4. Were reasons for withdrawals similar across groups	4.4	Unclear
14.5. If diagnostic test, was decision to perform reference test not dependent on results of test under study?	4.5	N/A
15. Was <u>blinding</u> used to prevent introduction of bias?	5	Yes
15.1. In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	5.1	Yes
15.2. Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	5.2	Yes
15.3. In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	5.3	N/A
15.4. In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	5.4	N/A
15.5. In diagnostic study, were test results blinded to patient history and other test results?	5.5	Yes
16. Were <u>intervention</u>/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were <u>intervening factors</u> described?	6	Yes
16.1. In RCT or other intervention trial, were protocols described for all regimens studied?	6.1	Yes
16.2. In observational study, were interventions, study settings, and clinicians/provider described?	6.2	Yes
16.3. Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	6.3	Yes
16.4. Was the amount of exposure and, if relevant, subject/patient compliance measured?	6.4	Yes
16.5. Were co-interventions (e.g., ancillary treatments, other therapies) described?	6.5	Yes
16.6. Were extra or unplanned treatments described?	6.6	Yes
16.7. Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	6.7	Yes
16.8. In diagnostic study, were details of test administration and replication sufficient?	6.8	Yes
17. Were <u>outcomes</u> clearly defined and the <u>measurements valid and reliable</u>?	7	Yes
17.1. Were primary and secondary endpoints described and relevant to the question?	7.1	Yes
17.2. Were nutrition measures appropriate to question and outcomes of concern?	7.2	Yes
17.3. Was the period of follow-up long enough for important outcome(s) to occur?	7.3	Yes
17.4. Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	7.4	Yes
17.5. Was the measurement of effect at an appropriate level of precision?	7.5	Yes

17.6. Were other factors accounted for (measured) that could affect outcomes?	7.6	Yes
17.7. Were the measurements conducted consistently across groups?	7.7	Yes

18. Was the <u>statistical analysis</u> appropriate for the study design and type of outcome indicators?	8	Yes
18.1. Were statistical analyses adequately described the results reported appropriately?	8.1	Yes
18.2. Were correct statistical tests used and assumptions of test not violated?	8.2	Yes
18.3. Were statistics reported with levels of significance and/or confidence intervals?	8.3	Yes
18.4. Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	8.4	Yes
18.5. Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	8.5	Yes
18.6. Was clinical significance as well as statistical significance reported?	8.6	Yes
18.7. If negative findings, was a power calculation reported to address type 2 error?	8.7	Yes
19. **Are <u>conclusions supported by results</u> with biases and limitations taken into consideration?**	9	Yes
19.1. Is there a discussion of findings?	9.1	Yes
19.2. Are biases and study limitations identified and discussed?	9.2	Yes
20. Is bias due to study's <u>funding or sponsorship</u> unlikely?	10	Yes
20.1. Were sources of funding and investigators' affiliations described?	10.1	Yes
20.2. Was there no apparent conflict of interest?	10.2	Yes

MINUS/NEGATIVE (-)
If most (six or more) of the answers to the above validity questions are "No," the report should be designated with a minus (-) symbol on the Evidence Worksheet.

NEUTRAL (∅)
If the answers to validity criteria questions 2, 3, 6, and 7 do not indicate that the study is exceptionally strong, the report should be designated with a neutral (∅) symbol on the Evidence Worksheet.

PLUS/POSITIVE (+)
If most of the answers to the above validity questions are "Yes" (including criteria 2, 3, 6, 7 and at least one additional "Yes"), the report should be designated with a plus symbol (+) on the Evidence Worksheet.

STEP 4 & 5

Appendix 12: Tally Sheet of Quality Criteria Ratings

	Lu et al	Crawford, P.
Year	2012	2009
Relevance Questions		
1.	Yes	Yes
2.	Yes	Yes
3.	Yes	Yes
4.	Yes	Yes
Validity Questions		
1.	Yes	Yes
2.	Yes	Yes
3.	Yes	Yes
4.	Unclear	Yes
5.	Yes	Yes (5.2)
6.	Yes	Yes
7.	Yes	Yes
8.	Yes	Yes
9.	Yes	Yes
10.	Yes	Yes
Quality Rating (+, 0, -)	+	+

Appendix 14: Overview Table Template

Author, Year, Study, Design, Class Rating	Study Type/ Purpose	Study Population	Intervention	Outcomes	Limitations	Conclusion
Lu et al. (2012) Randomized Double-Blind Clinical Study Class: A Rating +	To analyze the effect of cinnamon extract on the levels of FBG and HbA1c in Chinese patients with type 2 diabetes	Ethnicity: Chinese Placebo group: N=20 60 ± 5.9 years Male (8) Female (12) Low dose (120mg/d) N=23 62.4 ± 7.9 years Male (8) Female (15) High Dose (360 mg/d) N= 23 58.9 ±6.4 years Male (9) Female (14)	Placebo: 2 control tablets per day Low dose: 2 tables containing 60 mg of cinnamon extract per day High dose: 6 tablets containing 60 mg of cinnamon extract per day Blood samples taken at baseline (pretreatment) and at cessation of study 3 months later (post treatment)	HbA1c and FBG levels were significantly reduced in post treatment in low and high dose groups. HbA1c in low dose group had an average reduction of 0.67% (p=.003). HbA1c in the high dose group had an average reduction of 0.92% (p=.0004). FBG in the low dose group had an average reduction of 1.01 mmol/L (p=.002). FBG in the high dose group had an average reduction of 1.62 mmol/L (p=.00008). Triglyceride levels were significantly reduced in the low dose group (p= .007).	Sample size in each group might be insufficient to identify the dose dependent effects of cinnamon extract on blood glucose control.	Cinnamon is able to improve blood glucose control in Chinese patients with type 2 diabetes.

Author, Year, Study, Design, Class Rating	Study Type/ Purpose	Study Population	Intervention	Outcomes	Limitations	Conclusion
Crawford, P. (2009) Randomized Controlled Trial Class: A Rating: +	To determine if cinnamon has a lowering capability on HbA1c levels in uncontrolled type 2 diabetics.	Ethnicity: Caucasian (83) African American (16) Latino (4) Asian (6) Treatment group: N=55 Female (23) Male (32) Mean age 60.5 ± 10.7 BMI 31.9 ± 6.4 Baseline hemoglobin A1c 8.47 ± 1.8 500 mg/daily of cinnamon supplement Control group: N=54 Female (22) Male (32) Mean age 59.9 ± 9.2 BMI 32.9 ± 6.4 Baseline hemoglobin A1c 8.28 ± 1.3	Treatment group: 2 capsules of Cinnamomum cassia (500 mg total) daily in addition to regular medications Control group: Proceed with usual care in addition to normal regular medications. Serum, non-fasting blood glucose drawn on day 0, followed by another draw on day 90-95 for both treatment and control group.	HbA1c levels were reduced in the treatment group receiving 2 500 mg capsules per day of cinnamon supplementation. Treatment group had a reduction of 0.83% (95% CI, 0.46-1.20). The usual care group had a reduction of 0.37% (CI 95%, 0.15-0.59).	No placebo was used due to the strong taste of cinnamon. Cinnamon capsules were off the shelf (from local stores/internet) and were not tested. No blinding of patients or physicians.	Cinnamon supplementation of 1g/daily may decrease HbA1c levels in type 2 diabetics.

Appendix 16: Conclusion Statement and Grade

Purpose of the Evidence Appraisal Process What evidence supports a relationship between cinnamon supplementation and reduced blood glucose levels/HbA1c in type 2 diabetics?
Conclusion Statement: Based on the literature review, we concluded that cinnamon supplementation of at least 120 mg/daily should be considered as an option for therapy in patients with type 2 diabetes when hyperglycemia is not well controlled with other therapies.
Conclusion Grade: Grade II: Fair Lu et al, (2012) and Crawford, P. (2009) do not have an adequate sample size and cannot be generalized to all populations. The quantity of studies reviewed is inadequate and there are minor inconsistencies with methodology. Therefore, the evidence has been given grade II-fair.

References

Crawford P. (2009). Effectiveness of cinnamon for lowering hemoglobin A1c in patients with type 2 diabetes: a randomized, controlled trial. *J Am Board Fam Med*. 22(5):507-12.

Lu, T., Sheng, H., Wu, J., Cheng, Y., Zhu, J., & Chen, Y. (2012). Cinnamon extract improves fasting blood glucose and glycosylated hemoglobin level in Chinese patients with type 2 diabetes. *Nutrition Research. 32*: 408-412. doi:10.1016/j.nutres.2012.05.003.