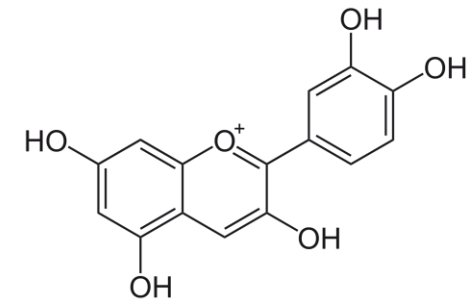
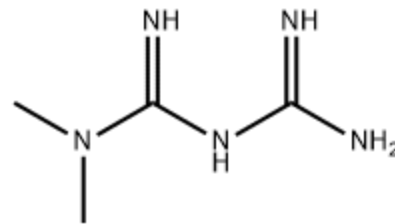




Story of Ceylon Cinnamon Nutraceutical “Cinnamon-X”

Metformin Vs Cinnamon-X



Metformin Vs Cinnamon-X

	Mean (±SD)								
	Visit 0 (Baseline) (n=210)		Visit 1 (4 Weeks) (n=199)	7 Weeks	Visit 2 (8 Weeks) (n=195)	11 Weeks	Visit 3 (12 Weeks) (n=188)		Visit 4 (16 Weeks) (n=186)
FPG (mg/dl)									
Placebo	129.5±50.6		127.4 ±53.4 (1.5%)		128.3±40.3 (0.9%)		128.6 ±51.1 (0.7%)		130.4±52.2 (0%)
Cinnamon 250mg	136.3 ±56.9*#		137.6 ±52.4 (0%)		132.8 ±55.5 (2.8%)		119.9±44.9*(12%)		121.8 ±48.4#(10.6%)
Cinnamon 500mg	136.5 ±54.8*#		131.1±50.1 (4%) ↓		131.5 ±57.1 (3.7%) ↓		121.5±40.5*(11%) ↓		120.2±45.2*(12%) ↓
Placebo	279±59.1			279.4 (0%)		271 (2.8%)			
Metformin 500mg	282±59.5			258 (8.5%) ↓		260 (7.8%) ↓			
Metformin 1000	281±60.3			240 (14.6%)		238 (15.3)			
Metformin 1500	262±51.7			213 (18.7%)		210 (19.8%)			
Metformin 2000	288±61.1			204 (29.1%)		200 (30.5%)			
Metformin 2500	287±59.9			225 (21.6%)		214 (25.4%)			
HbA1c (%)									
Placebo	8.0 ±1.7		NM		8.1±1.8 (0%)		NM		8.2±1.9 (0%)
Cinnamon 250mg	8.2 ±1.8*		NM		7.9 ±1.9 (3.6%)		NM		7.7±1.7*(6%)
Cinnamon 500mg	8.7 ±1.8*#		NM		8.1±1.7#(6.9%) ↓		NM		7.9 ±1.7*(9.2%) ↓
Placebo	9.9±1.9			11 (Increased)		11.1(Increased)			
Met 500mg	10.1±1.7			10.5 (0%) ↓		10.3 (0%) ↓			
Met 1000	10.0± 2.0			9.99 (0.1%)		9.9 (1%)			
Met 1500	9.7± 1.5			9.4 (3%)		9.1 (6.2%)			
Met 2000	10.1±2.1			9.6 (5%)		9.2 (8.9%)			
Met 2500	10.0±1.8			9.9 (1%)		9.5 (5%)			

Cinnamon phase II/III clinical trial - changes in cholesterol and triglycerides

	Mean (\pm SD)		
	Visit 0 (Baseline)(n=210)	Visit 2 (2 months)(n=195)	Visit 4 (4 months)(n=186)
Total cholesterol (mg/dl)			
Placebo	185.4 (\pm 49.1)	178.8 (\pm 48.1)	181.8 (\pm 48.6)
Cinnamon 250	167.7 (\pm 40.1)	170.3 (\pm 39.4)	172.3 (\pm 44.6)
Cinnamon 500	178.9 (\pm 39.1)*	174.1 (\pm 45.3)	164.7 (\pm37.7)*
LDL cholesterol (mg/dl)			
Placebo	109.0 (\pm 42.1)	105.4 (\pm 43.4)	103.1 (\pm 31.8)
Cinnamon 250	97.6 (\pm 36.3)	105.7 (\pm 41.1)	101.4 (\pm 32.9)
Cinnamon 500	106.1 (\pm 35.7)*	100.8 (\pm 38.6)	96.1 (\pm28.5)*
HDL cholesterol (mg/dl)			
Placebo	49.7 (\pm 12.2)	47.7 (\pm 11.4)	49.1 (\pm 12.1)
Cinnamon 250	47.2 (\pm 11.9)	46.4 (\pm 13.1)	47.5 (\pm 11.3)
Cinnamon 500	48.9 (\pm 11.8)	46.4 (\pm 13.1)	47.5 (\pm 11.3)
Triglycerides (mg/dl)			
Placebo	124.4 (\pm 60.2)	128.2 (\pm 54.0)	122.1 (\pm 42.6)
Cinnamon 250	117.4 (\pm 44.8)	114.4 (\pm 39.6)	120.4 (\pm 57.7)
Cinnamon 500	117.1 (\pm 52.0)	114.3 (\pm 41.8)	117.6 (\pm 53.8)

Cinnamon phase II/III clinical trial - changes in blood pressure and anthropometric parameters

	Mean (\pm SD)				
	Visit 0 (Baseline)(n=210)	Visit 1 (1 month)(n=199)	Visit 2 (2 months)(n=195)	Visit 3 (3 months)(n=188)	Visit 4 (4 months)(n=186)
Systolic Blood Pressure (mmHg)					
Placebo	132.6 (\pm 19.1)*	131.3 (\pm 19.5)	128.5 (\pm 16.9)	125.1 (\pm 12.4)*	131.4 (\pm 14.8)
Cinnamon 250	127.8 (\pm 17.6)	125.6 (\pm 14.2)	127.8 (\pm 13.6)	124.9 (\pm 14.3)	127.1 (\pm 13.1)
Cinnamon 500	131.2 (\pm 19.3)*	129.6 (\pm 17.6)	128.7 (\pm 17.1)	124.2 (\pm 14.7)*	128.3 (\pm 14.7)
Diastolic Blood Pressure (mmHg)					
Placebo	77.9 (\pm 10.4)	76.7 (\pm 12.3)	79.1 (\pm 7.3)	79.5 (\pm 7.6)	80.0 (\pm 6.7)
Cinnamon 250	76.8 (\pm 9.7)	78.1 (\pm 9.0)	78.6 (\pm 9.3)	78.9 (\pm 6.7)	79.2 (\pm 7.1)
Cinnamon 500	77.8 (\pm 9.8)	76.8 (\pm 9.5)	78.4 (\pm 8.3)	77.2 (\pm 8.5)	78.1 (\pm 7.3)
Body mass index (kg/m²)					
Placebo	24.9 (\pm 4.4)	24.7 (\pm 3.2)	25.3 (\pm 2.9)	23.9 (\pm 3.9)	25.2 (\pm 3.8)
Cinnamon 250	25.8 (\pm 4.3)	25.4 (\pm 3.7)	24.9 (\pm 3.2)	24.5 (\pm 3.6)	25.7 (\pm 3.5)
Cinnamon 500	26.3 (\pm 4.9)	26.1 (\pm 4.2)	25.3 (\pm 5.2)	26.2 (\pm 4.9)	26.6 (\pm 5.2)
Waist circumference (cm)					
Placebo	94.9 (\pm 10.5)	97.6 (\pm 8.5)	98.3 (\pm 8.3)	99.0 (\pm 8.1)	98.5 (\pm 8.1)
Cinnamon 250	96.3 (\pm 8.3)	95.8 (\pm 7.9)	95.2 (\pm 9.3)	96.0 (\pm 10.1)	96.1 (\pm 10.9)
Cinnamon 500	98.2 (\pm 12.4)	97.9 (\pm 11.8)	98.1 (\pm 9.9)	97.6 (\pm 9.9)	98.4 (\pm 12.1)
Hip circumference (cm)					
Placebo	97.0 (\pm 9.6)	96.0 (\pm 7.2)	96.4 (\pm 9.2)	95.9 (\pm 9.5)	96.6 (\pm 9.7)
Cinnamon 250	97.0 (\pm 10.2)	95.6 (\pm 7.9)	97.1 (\pm 9.6)	97.7 (\pm 8.5)	95.7 (\pm 8.3)
Cinnamon 500	98.6 (\pm 13.1)	100.1 (\pm 12.3)	99.8 (\pm 9.5)	99.5 (\pm 8.9)	98.9 (\pm 9.8)
Waist to Hip ratio					
Placebo	0.98 (\pm 0.09)	0.97 (\pm 0.05)	0.99 (\pm 0.06)	0.98 (\pm 0.05)	0.99 (\pm 0.06)
Cinnamon 250	0.99 (\pm 0.08)	0.97 (\pm 0.06)	0.96 (\pm 0.06)	0.98 (\pm 0.07)	0.97 (\pm 0.05)
Cinnamon 500	0.99 (\pm 0.07)	1.00 (\pm 0.05)	0.99 (\pm 0.05)	0.97 (\pm 0.06)	0.98 (\pm 0.06)

Cinnamon phase II/III clinical trial - liver and renal function test

	Mean (\pm SD)				
	Visit 0 (Baseline)(n=210)		Visit 2 (2 months)(n=195)		Visit 4 (4 months)(n=186)
Alanine aminotransferase (U/l)					
Placebo	20.8 (\pm 9.5)		21.2 (\pm 9.4)		22.1 (\pm 9.9)
Cinnamon 250	22.7 (\pm 12.8)		25.1 (\pm 6.0)		23.4 (\pm 9.2)
Cinnamon 500	22.8 (\pm 15.4)		25.1 (\pm 6.0)		20.1 (\pm 10.2)
Aspartate aminotransferase (U/l)					
Placebo	18.2 (\pm 9.5)		18.5 (\pm 8.9)		20.0 (\pm 7.0)
Cinnamon 250	16.4 (\pm 9.0)		17.4 (\pm 9.1)		18.3 (\pm 8.0)
Cinnamon 500	18.1 (\pm 8.7)		19.2 (\pm 8.0)		22.0 (\pm 9.7)
PT/INR					
Placebo	1.1 (\pm 0.2)		1.0 (\pm 0.2)		1.3 (\pm 0.4)
Cinnamon 250	1.1 (\pm 0.3)		1.1 (\pm 0.2)		1.0 (\pm 0.3)
Cinnamon 500	1.1 (\pm 0.3)		0.9 (\pm 0.3)		1.2 (\pm 0.3)
Serum Bilirubin (mg/dl)					
Placebo	0.3 (\pm 0.2)		0.4 (\pm 0.1)		0.3 (\pm 0.2)
Cinnamon 250	0.2 (\pm 0.2)		0.3 (\pm 0.2)		0.4 (\pm 0.2)
Cinnamon 500	0.3 (\pm 0.2)		0.4 (\pm 0.3)		0.2 (\pm 0.2)
Serum Creatinine(mg/dl)					
Placebo	0.9 (\pm 0.3)		1.0 (\pm 0.2)		0.9 (\pm 0.2)
Cinnamon 250	1.0 (\pm 0.4)		0.8 (\pm 0.3)		0.9 (\pm 0.1)
Cinnamon 500	0.9 (\pm 0.3)		0.9 (\pm 0.2)		1.0 (\pm 0.2)

Metformin Hydrochloride Market

The global metformin hydrochloride market is led by players like Shouguang Fukang Pharmaceutical, CR Double-Crane, Wanbury, Keyuan Pharmaceutical, Aarti Drugs, Farmhispania Group, Harman Finochem, Exemed Pharmaceuticals, Vistin Pharma, Shijiazhuang Polee Pharmaceutical, and USV.

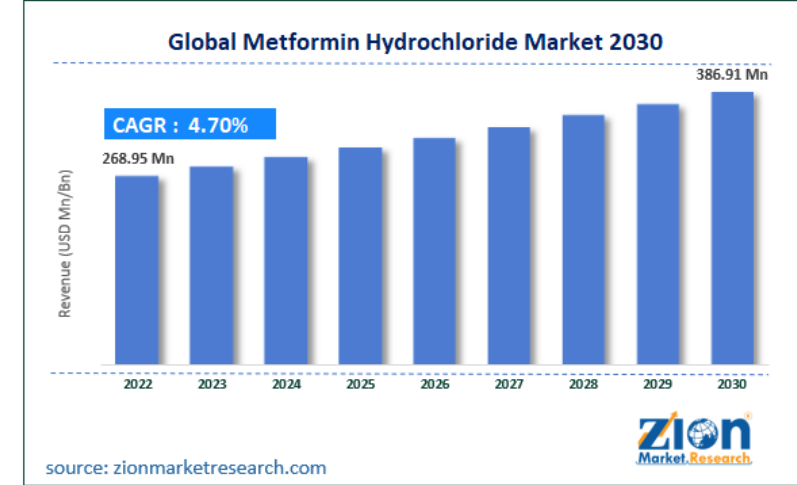
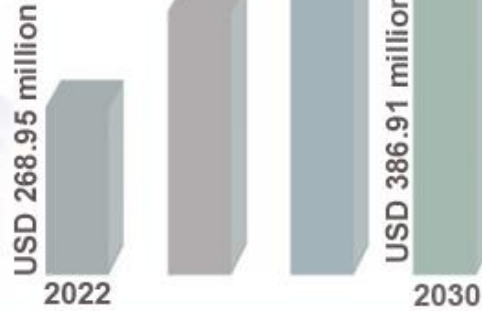
By Application

- Extended Release
- Immediate Release
- Combination Medicines
- Oral Solutions

2023-2030
CAGR
4.7%

Regional Analysis

North America | Europe | Asia Pacific
Latin America | Middle East and Africa



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Metformin Hydrochloride Market: Growth Drivers

Rising number of patients with type 2 diabetes to drive market growth

Metformin Hydrochloride Market: Restraints

Side effects associated with the medicine to restrict market growth

Key Points

FPG (mg/dl)

Cinnamon-X @ 500mg
12% ↓

Metformin @ 500mg
7.8% ↓

HbA1c (%)

9.2% ↓

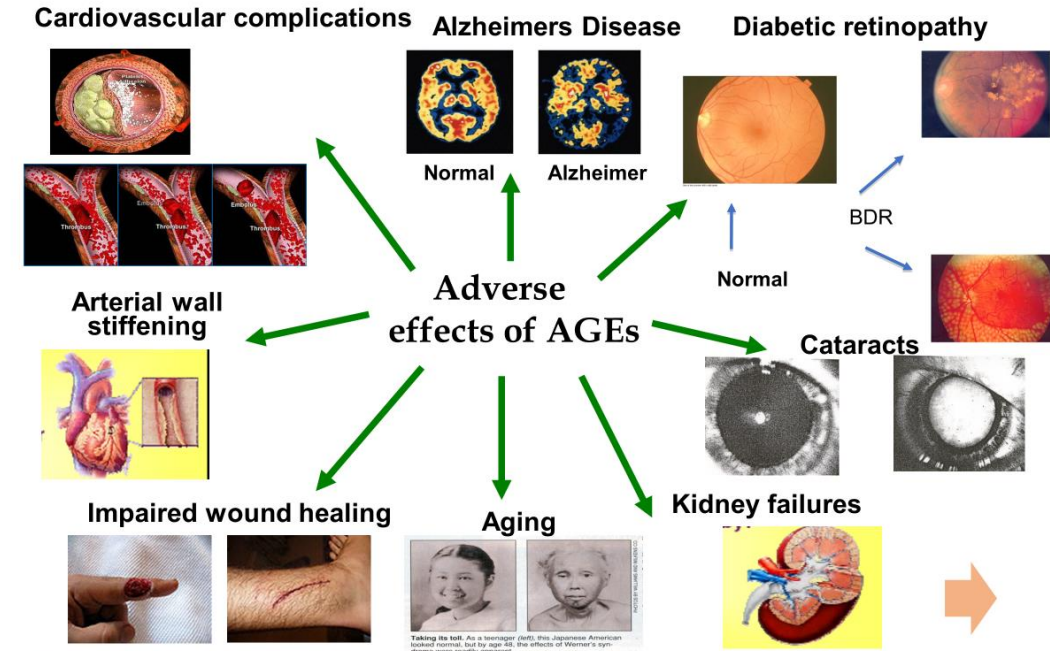
0.0% ↓

8.9% ↓ (@2000mg)

Other Health Benefits of Cinnamon-X

- ∞ Reduces Blood Glucose
- ∞ Reduces HbA1c
- ∞ Reduces Total Cholesterol
- ∞ Reduces LDL Cholesterol
- ∞ Maintain Healthy HDL Cholesterol
- ∞ Liver and Kidney functions remain normal

Diabetic complications



Summary of the research findings

- **Bark and leaf of Ceylon cinnamon** possess range of medically important bio active properties such as **antioxidant, anti-diabetic, antilipidemic, anti-inflammatory, skin anti-aging and anti-cancer** related activities
- **Bark is superior to leaf** in terms of **all the investigated bioactive properties** (except antioxidant and anti-glycation activities)
- In general **ethanolic extracts** are **more potent** than DCM:M extracts
- **1st report bio active properties of authenticated leaf**

All the investigated bio activities (except antioxidant activity and anti-amylase activity)

- **1st report bio active properties of authenticated bark**

Anti-diabetic activity	Anti-amylase, anti-glycation and glycation reversing activities Increase cellular uptake of Glucose
Antilipidemic activity	HMG-CoA reductase, cholesterol esterase and cholesterol micellization inhibitory activities and bile acids binding ability
Anti-inflammatory activity	COX1 and COX2 inhibition, lysosome membrane stabilization as evidence from rat red blood cell membrane stability
Skin anti-aging activity	Anti-elastase, anti-collagenase, anti-hyaluronidase, anti-tyrosinase activities
Anti-cancer activity	Glutathione S-transferase inhibition, cytotoxicity against AN3CA carcinoma cells

- The study scientifically validated some of the Sri Lankan traditional knowledge on medicinal properties of Ceylon cinnamon
- Findings of the study contributed for scientific advancement and strengthening of the scientific knowledge on health benefits Ceylon cinnamon
- This research added value to the stem bark, the most economical part of Ceylon cinnamon and also the leaf, commercial part uses in extraction of leaf essential oil
- Findings show the possibility of using both bark and leaf of Ceylon cinnamon in formulating functional foods, nutraceuticals and cosmaceuticals
- Finally, the findings of this study may essentially help to promote Sri Lankan cinnamon at international trade since it is the true cinnamon worldwide with many health benefits

