

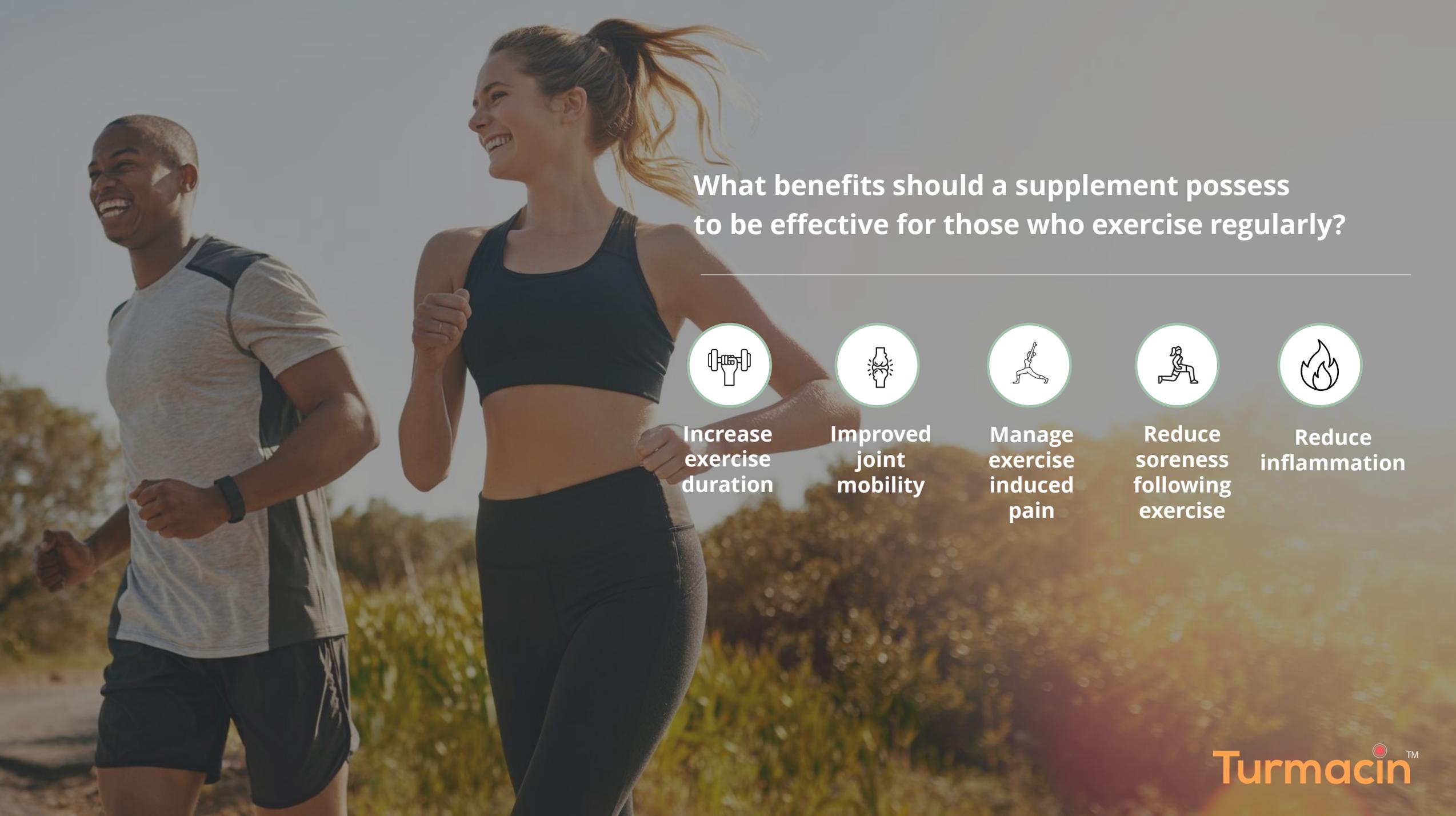


# Turmacin™

Discover the power of water-soluble Turmerosaccharides®

EFFECTIVE • NATURAL • SAFE





What benefits should a supplement possess to be effective for those who exercise regularly?



Increase exercise duration



Improved joint mobility



Manage exercise induced pain



Reduce soreness following exercise



Reduce inflammation

EXPLORING TURMERIC



# The Two Components of Turmeric



  
**EXPLORED**  
Curcuminoids

2.5% - 6%

  
Whole Turmeric  
Powder

  
Volatile Oil  
Portion



**UNEXPLORED**  
15% - 20%  
of extractable components of  
turmeric

# Turmacin™

Discover the power of water-soluble Turmerosaccharides®

Featuring water soluble Turmerosaccharides®,  
the bioactive polysaccharides.

**Turmacin® is an innovative clinically researched  
and patented ingredient that brings the joint  
and cartilage health benefits of turmeric to  
dietary supplements.**



# Turmerosaccharides®

THE BIO ACTIVE POLYSACCHARIDES



Investigation &  
Research



Water Soluble Portion  
of Turmeric



**Turmerosaccharides®**  
Bioactive polysaccharides

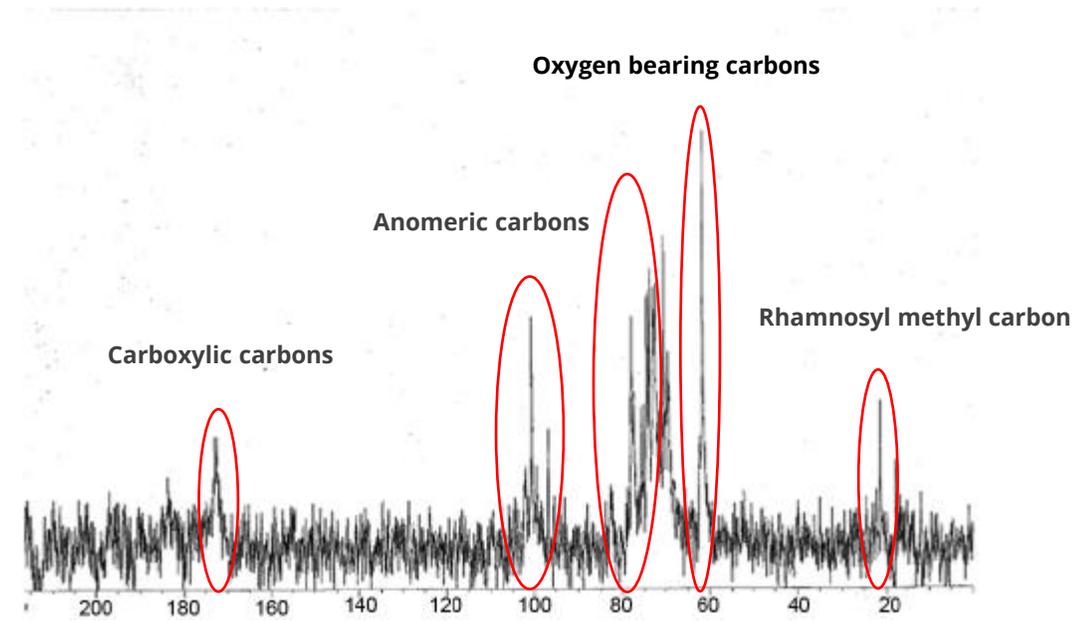
# Turmerosaccharides®

## THE BIOACTIVE POLYSACCHARIDES

- Turmerosaccharides® are a group of water-soluble bioactive polysaccharides present in Turmeric
- Patented composition- US PATENT: US9345258
- The activity of Turmerosaccharides® is validated by several studies

## Chemistry & Standardization

Turmerosaccharides® are identified in Turmacin® by using <sup>13</sup>C-NMR spectroscopy by confirming the presence of polysaccharide components.



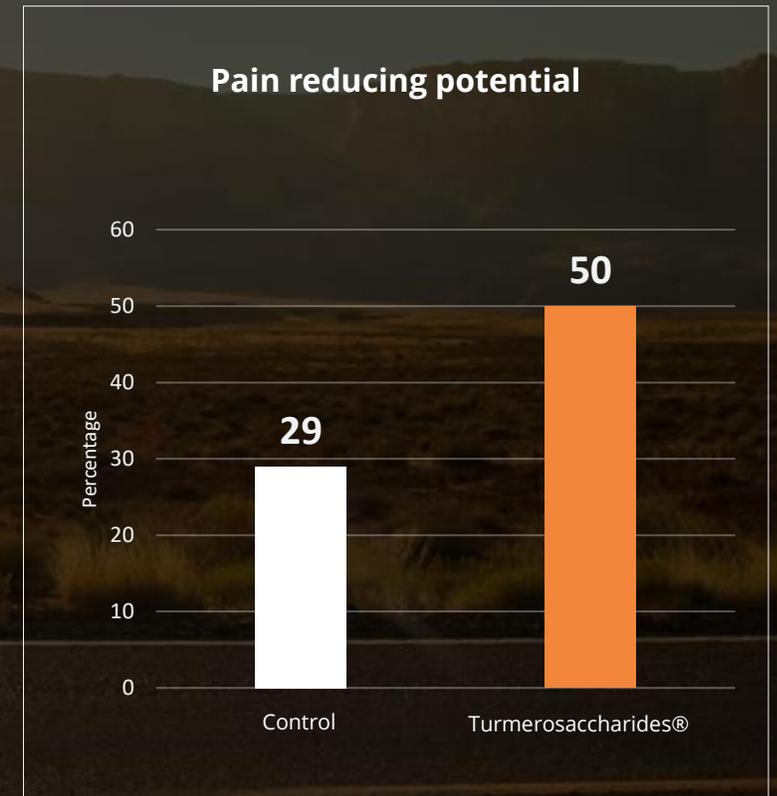
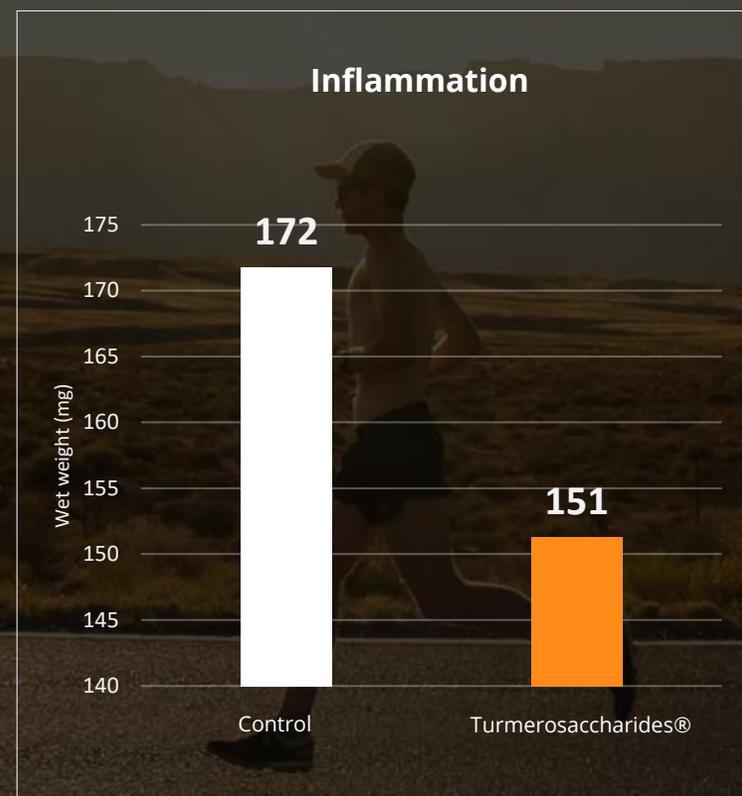
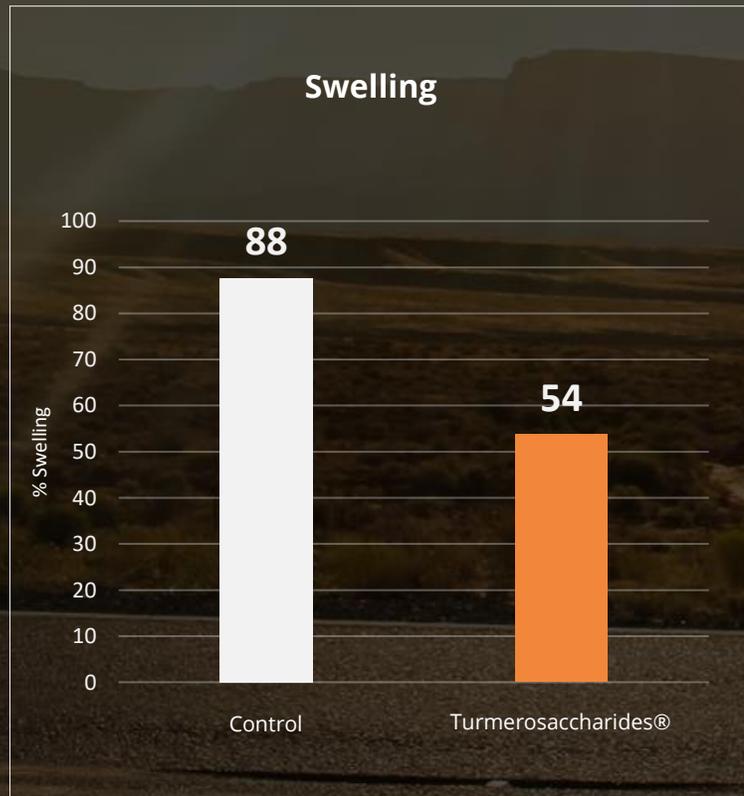
<sup>13</sup>C NMR spectrum of polysaccharide fraction of Turmacin in D<sub>2</sub>O

## Composition

Turmerosaccharides® are composed of the polysaccharide Ukonan D with other polysaccharides -Ukonan A, Ukonan B and Ukonan C.

# Turmerosaccharides®

## Pre- Clinical Evidence For Biological Activity



**Outcome:** Turmerosaccharides® were studied for its biological activities like reducing swelling, inflammation and pain and was found to be effective



HOW DOES

**Turmacin**<sup>TM</sup>

BENEFIT THOSE WHO  
EXERCISE REGULARLY?



### 4 Clinical studies for Efficacy

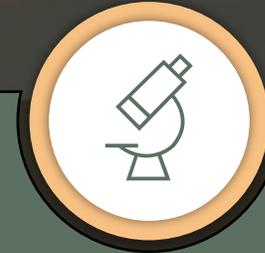
1 Study for enhanced performance (exercise);

3 studies on Joint health;



### 1 exclusive clinical safety study

Safety evaluation of Turmacin® in healthy volunteers.



### 7 Preclinical studies

Anti-inflammatory, osteoarthritic pain and cartilage protective activity; Acute oral toxicity;

1. Madhu et al. Inflammopharmacology 2013, 21(2): 129-136
2. Jeffrey Pradeep Raj et al, Complementary Therapies in Medicine 53 (2020) 102522
3. Senthilkumar et al. Journal of Korean Society Food Science and Nutrition 2014, 43(1): 612-617
4. Sasikumar et al. Anti-Inflammatory & Anti-Allergy Agents in Medicinal Chemistry, 2017, 16, 193-202
5. Velusami et al. Inflammopharmacology. 2018 Jan 8. doi: 10.1007/s10787-017-0433-1.
6. Chandrasekaran et al. BioMed Research International 2013, 2013: 158348, 10 pages
7. In-house draft report

1

# Turmacin™

Clinically Studied For Enhanced Performance  
(Exercise)

A randomized placebo-controlled study



## Condition

Healthy Volunteers



## Dose

500 mg and 1000 mg



## Duration

84 Days



## Evaluation

Evaluation of pain at days 1, 5, 7, 28, 56, and 84 for VAS; Time to onset of pain; Range of Movement using Electrogoniometry, Joint function and force assessment using Isokinetic dynamometry



## Participants

Total Participants : 90 Subjects  
( 30 in each group )



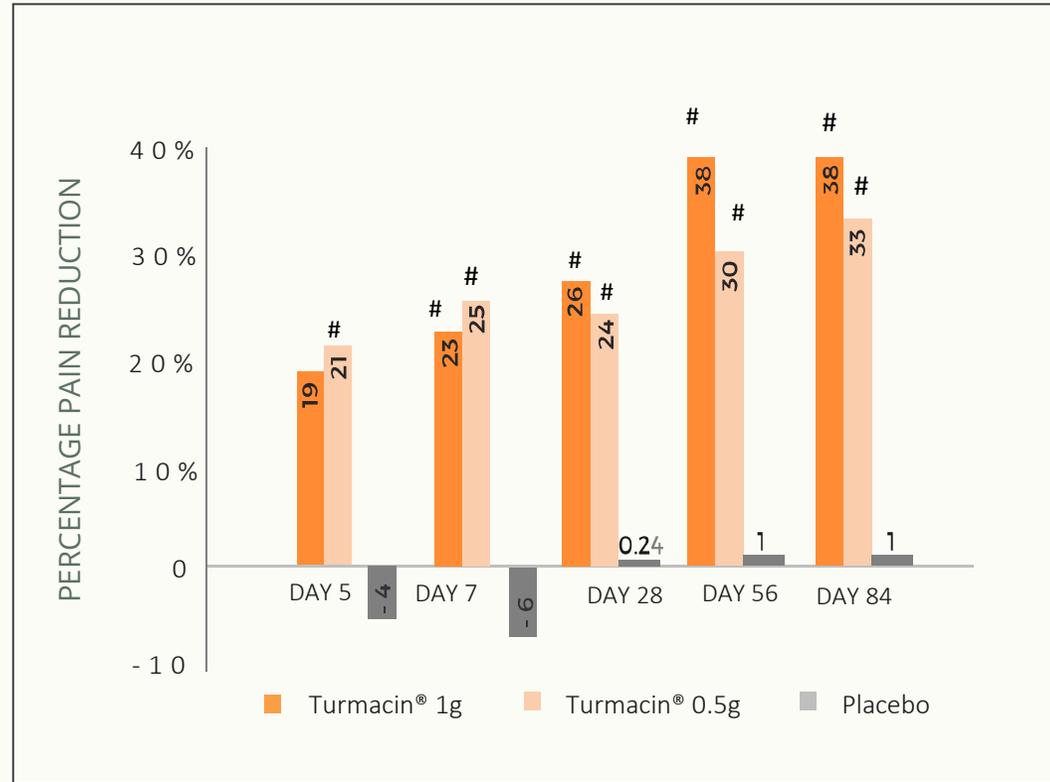
## Outcome

Turmacin® (500 mg and 1000 mg) was efficacious when compared to placebo in increasing the pain threshold and knee ROM in healthy participants

# Turmacin™

Offers significant pain reduction

## EQUIPMENT USED: STEP-MILL



#Significantly different (p<0.05) from placebo



## OUTCOMES :

- Turmacin® significantly decreased joint pain induced by Step-Mill
- Increased effect on pain relief on long term usage



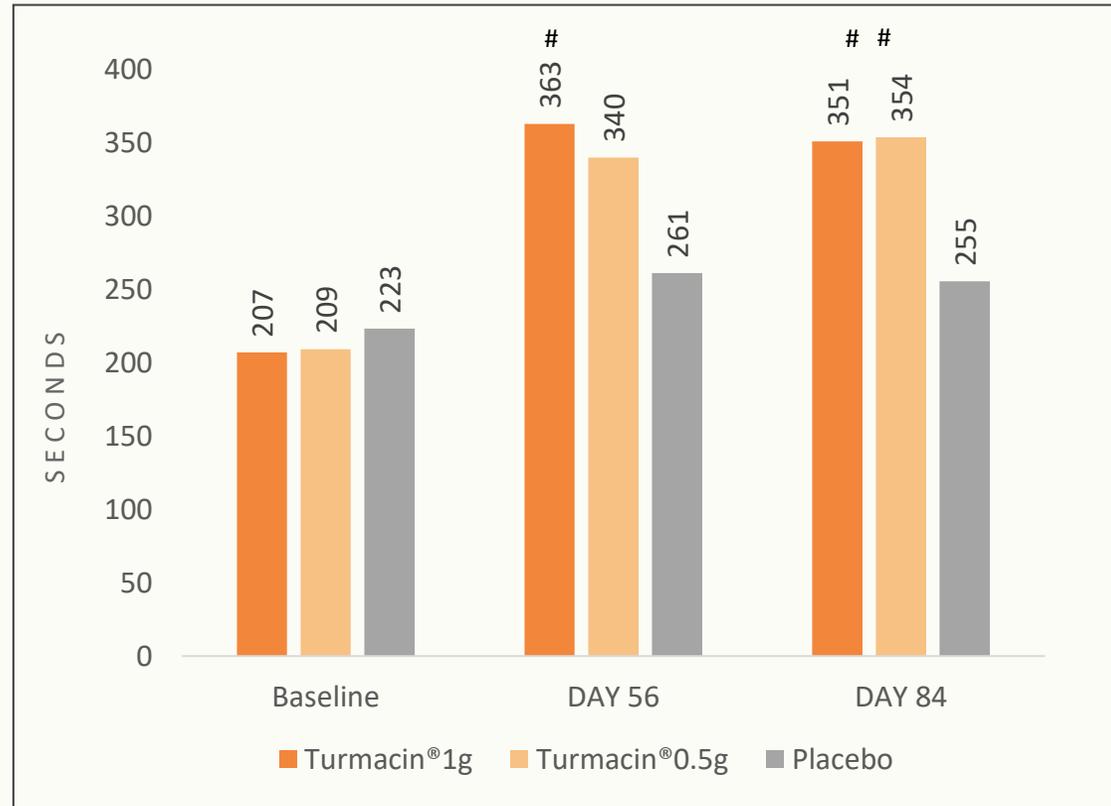
## HEALTH CLAIM:

Helps to reduce exercise induced joint pain\*

# Turmacin™

Increased time to onset of pain during exercise.

EQUIPMENT USED: STEP-MILL



#Significantly different ( $p < 0.016$ ) from placebo



OUTCOME :

On long term usage increases duration of pain free exercise induced by Step-Mill



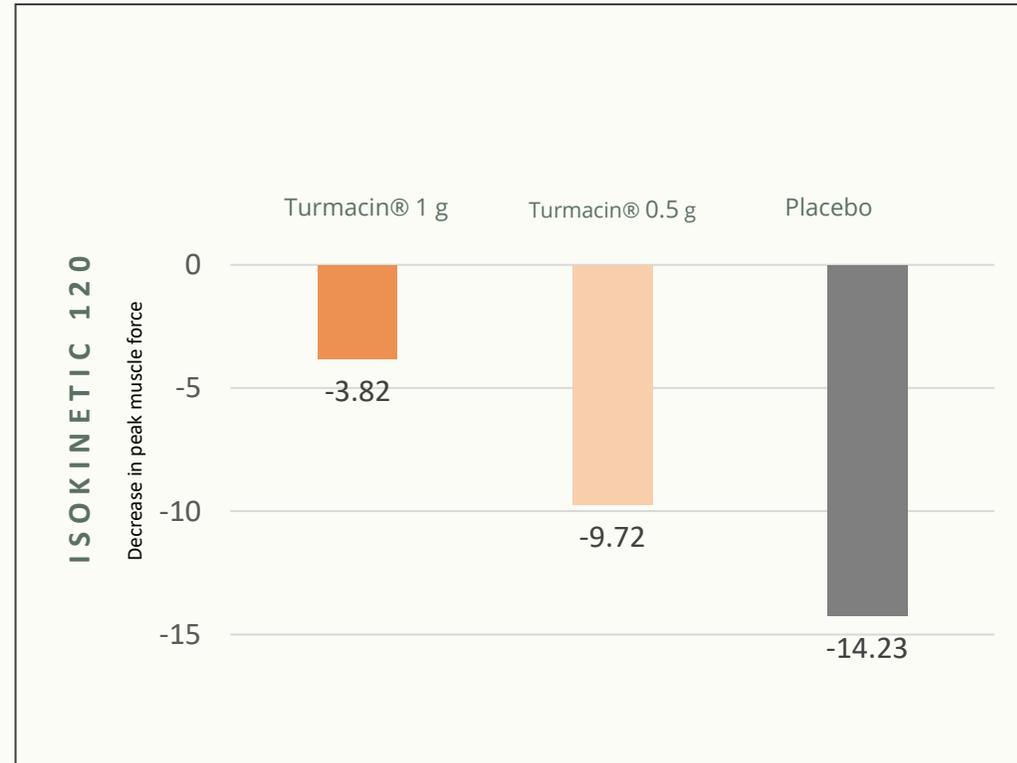
HEALTH CLAIM:

Delay the onset of joint discomfort during exercise or exertion\*

# Turmacin™

Preserved muscle strength during periods of physical inactivity.

EQUIPMENT USED:  
ISOKINETIC DYNAMOMETER



OUTCOME :

Turmacin® preserves muscle strength when measured using Isokinetic Dynamometer



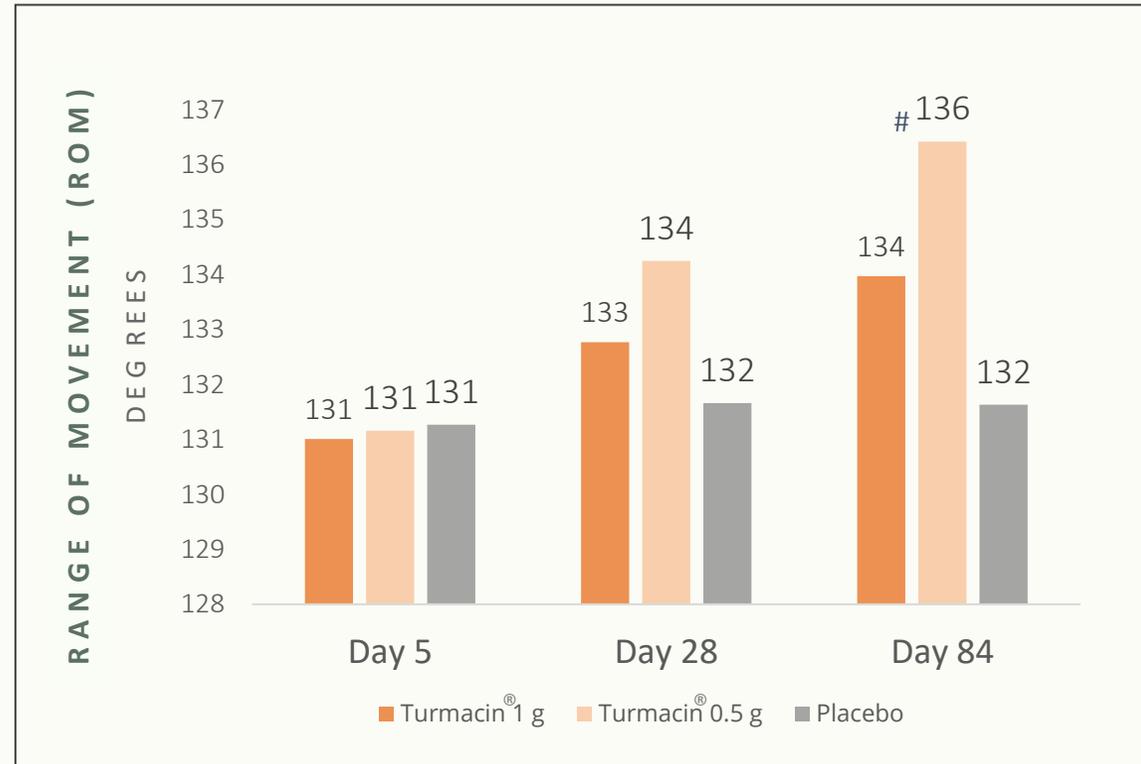
HEALTH CLAIM:

Improve joint comfort/  
mobility during exercise or  
exertion\*

# Turmacin™

## Improves Range of Movement (ROM)

EQUIPMENT USED:  
DIGITAL GONIOMETRY



#Significantly different (p<0.05) from placebo



**OUTCOME :**

Improves joint mobility  
measured using Digital  
Goniometry



**HEALTH CLAIM:**

Supports joint mobility\*

# Turmacin<sup>TM</sup>

SUPPORTS JOINT HEALTH  
FOR THOSE WHO  
EXERCISE REGULARLY  
(Enhanced performance)



**Turmacin<sup>®</sup> significantly decreased joint pain by day 5**

Health claim: Helps to reduce exercise induced joint pain\*



**Turmacin<sup>®</sup> increased time to onset of pain during exercise**

Health claim: Delay the onset of joint discomfort during exercise or exertion\*

## SUMMARY



**Turmacin<sup>®</sup> preserved muscle strength during periods of physical inactivity**

Health claim: Improve joint comfort/ mobility during exercise or exertion\*



**Turmacin<sup>®</sup> improved joint mobility**

Health claim: Supports joint mobility\*

2

# Turmacin<sup>TM</sup>

**Turmacin® was effective than  
Glucosamine in pain reduction and  
knee function**

A randomized placebo-controlled study



## Condition

Subjects with  
primary knee  
osteoarthritis



## Dose

500 mg twice a day



## Duration

42 Days



## Evaluation

On day 21 and day 42 using  
WOMAC, VAS, and CGIC scales



## Participants

**Total Participants : 90 Subjects  
(30 in each group)**

(Age: ≥40 years)

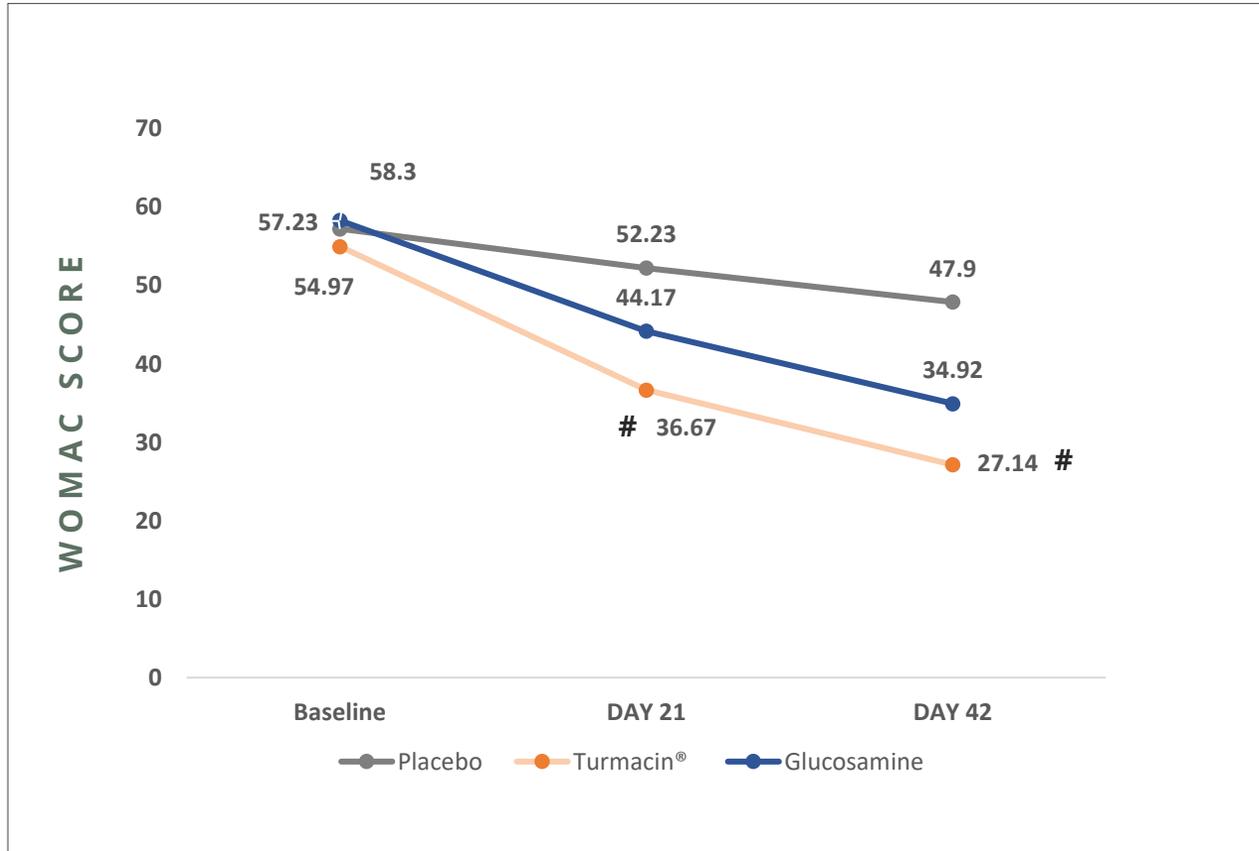


## Outcome

Turmacin® effectively managed the  
symptoms of knee osteoarthritis  
and supported physical function of  
knee joints

# Turmacin<sup>TM</sup>

## Evidence from WOMAC score



#Significantly different ( $p < 0.05$ ) from placebo

WOMAC: Western Ontario and McMaster Universities Osteoarthritic Index

### OUTCOME :

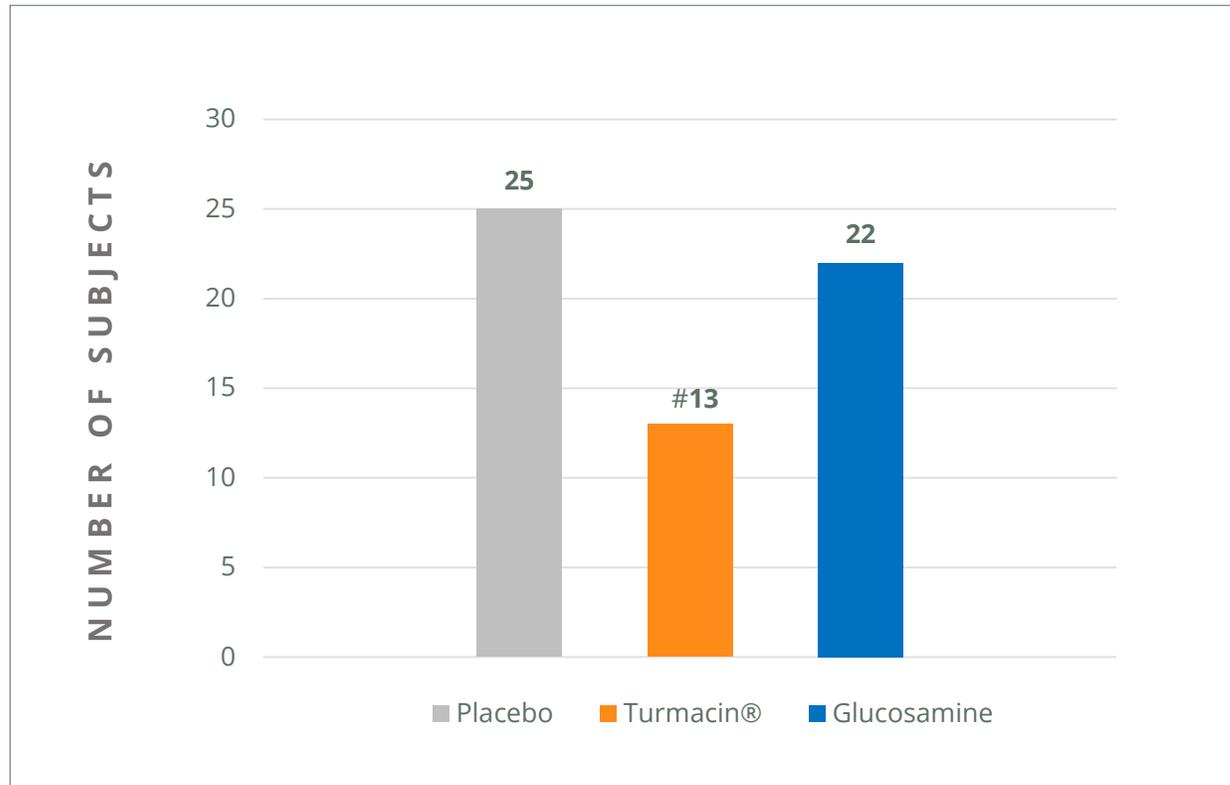
Turmacin<sup>®</sup> decreased WOMAC score by 51% more compared to Glucosamine(40%)

### HEALTH CLAIM :

Helps to maintain healthy joint function\*

# Turmacin™

## Usage of rescue medication (Acetaminophen)



#Significantly different ( $p < 0.01$ ) from placebo

### OUTCOME :

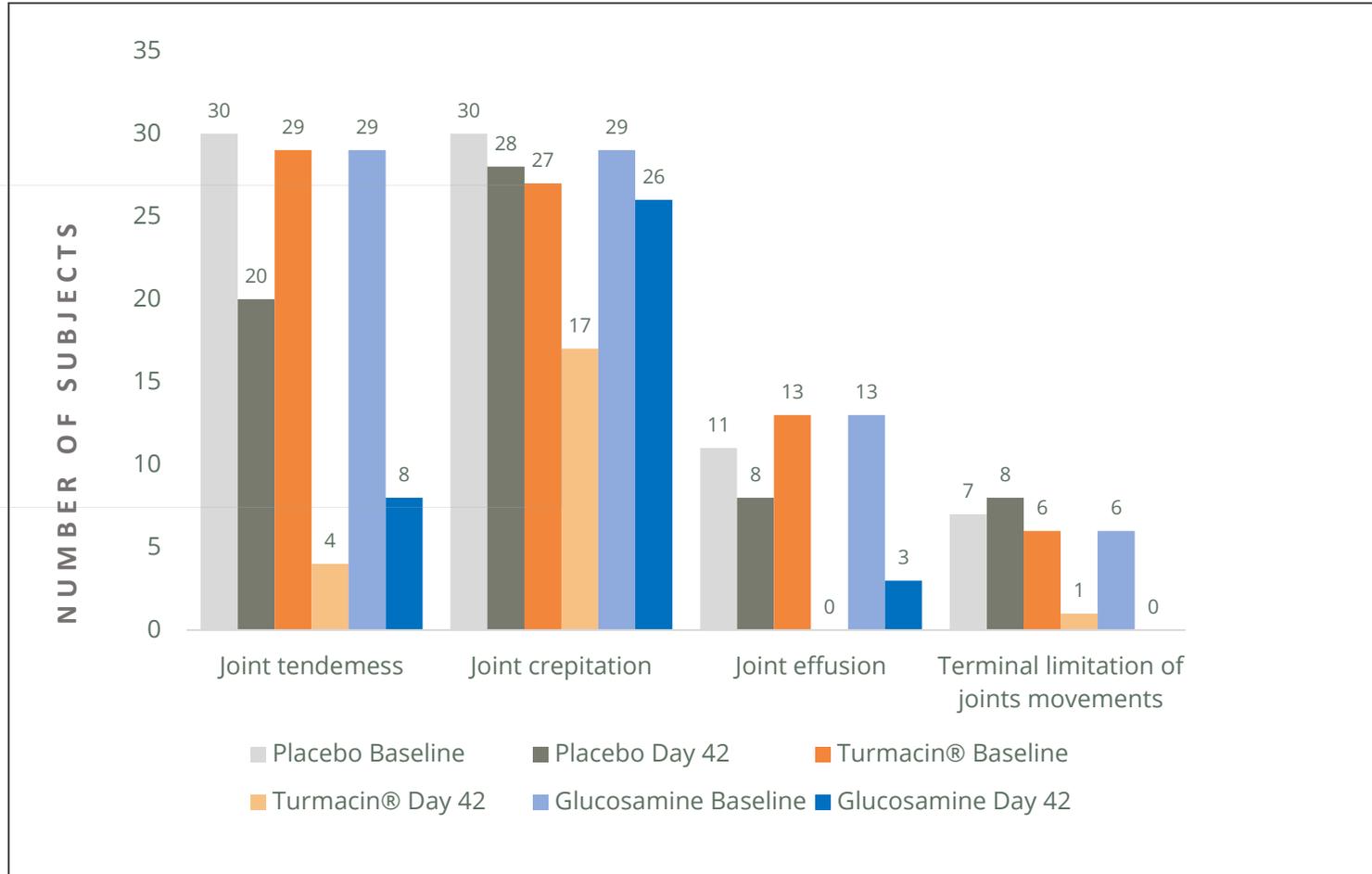
57% of the subjects on Turmacin® did not use Acetaminophen to relieve pain during the course as compared to 27% subjects on Glucosamine.

### HEALTH CLAIM :

Helps to maintain healthy joint function\*

# Turmacin™

Anti-inflammatory effect



## OUTCOMES:

↓53%

Joint Tenderness

↓30%

Joint Crepitation

↓73%

Joint Effusion

↓53%

Terminal Limitation of Joint Movements

# Turmacin<sup>TM</sup>

## SUPPORTS JOINT HEALTH



**Turmacin<sup>®</sup> was effective than Glucosamine in pain reduction and knee function**

Health claim: Helps to maintain healthy joint function\*



**Turmacin<sup>®</sup> decreased WOMAC score by 51% more compared to Glucosamine (40%)**

### SUMMARY



**57% of the subjects on Turmacin<sup>®</sup> did not use Acetaminophen to relieve pain during the course as compared to 27% subjects on Glucosamine.**



**Turmacin<sup>®</sup> shows good anti-inflammatory effect**

Disclaimer: \*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

# Turmacin™

TURMACIN® HAS BETTER EFFECT OR  
EQUIVALENT EFFECT AS COMPARED  
TO CURCUMIN ACCORDING TO AN  
INDEPENDENT META ANALYSIS  
STUDY



UNIVERSITY of  
TASMANIA  
AUSTRALIA

According to an independent Meta-analysis  
study (12 clinical studies) conducted in  
University of Tasmania, Australia



Turmacin® has either better effects or equivalent effects on **pain reduction and improving knee function** when compared with other turmeric (curcuminoids) formulations with and without bio-enhancers

# Turmacin™

## SAFETY STUDY



### Condition

Healthy volunteers



### Dose

1000mg and 2000mg



### Duration

84 Days



### Evaluation

Adverse events, Hematological, biochemical & urinalysis parameters were assessed at baseline **day 42 and 84.**



### Participants

**Total participants= 48**  
(24 each group)



### Outcome

**Turmacin® containing Turmerosaccharides® was found to be safe tolerable at both the tested doses administered for the given duration of trial period in healthy adult volunteers**

# Turmacin™

SAFETY PARAMETER STUDIED  
IN HEALTHY VOLUNTEERS –  
CLINICAL STUDY



## Condition

Healthy volunteers



## Dose

500 mg and 1000mg



## Duration

84 Days



## Evaluation

Evaluated for AST, ALT, Hemoglobin,  
Creatinine  
and Glucose levels



## Participants

Total participants= 90  
(30 each group)

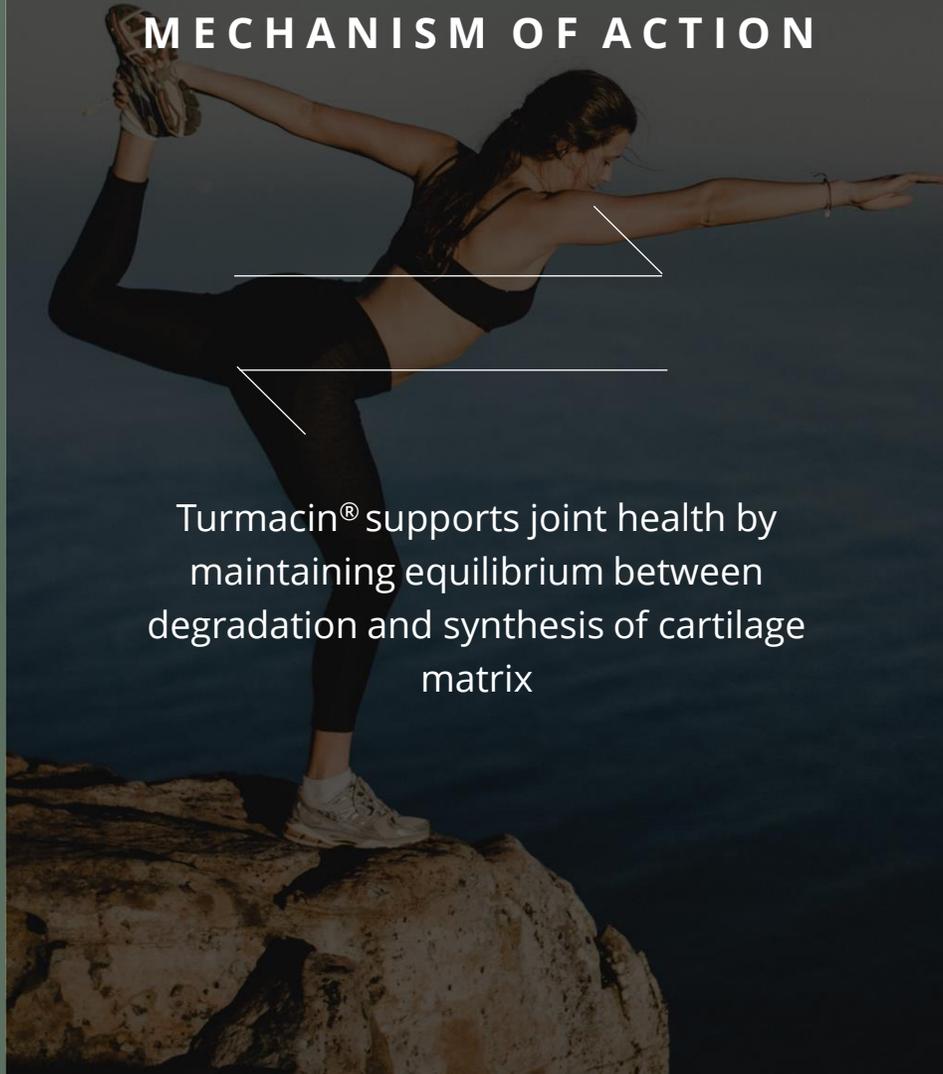


## Outcome

No significant differences between  
groups and no clinically relevant  
changes in the safety parameters  
after treatment with Turmacin® at  
500mg and 1000 mg for 84 days

# Turmacin™

## MECHANISM OF ACTION



## DEGRADATION

- 01 Pro-inflammatory mediators
- 02 Aging
- 03 Reactive oxygen species

## SYNTHESIS

- 01 Collagen synthesis
- 02 Proteoglycan synthesis
- 03 Anti-inflammatory cytokines

Turmacin® supports joint health by maintaining equilibrium between degradation and synthesis of cartilage matrix



BENEFITS OF

**Turmacin**<sup>TM</sup>

FOR SPORTS (EXERCISE)  
FORMULATIONS

# Turmacin<sup>TM</sup>

Turmacin<sup>®</sup> is clean label project certified<sup>®</sup>. It is a 100% Turmeric extract. No excipients are added.



# Turmacin™



**Naturally Bioavailable- No  
need for artificial bio-  
availability enhancement**



**Turmacin® is a 100%  
Turmeric extract. No  
excipients are added.**



**Aqueous extraction-  
No harmful solvents  
used**



**Light in color and  
neutral in taste**



**Certified organic  
grades available**



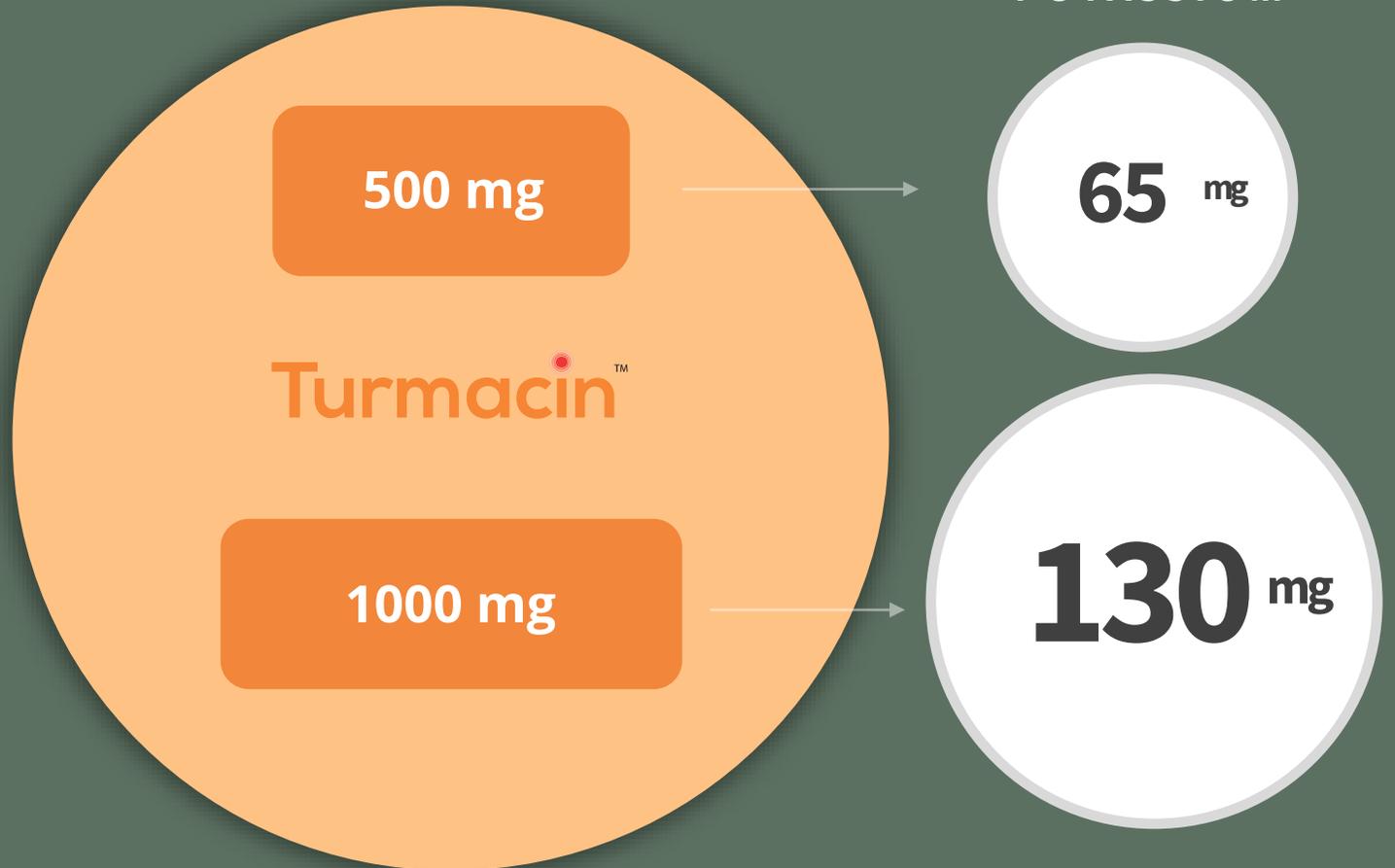
**Self affirmed GRAS**



# Turmacin™

Positively affects natural potassium increase

## POTASSIUM



- "Turmacin® contains potassium, which helps maintain healthy muscle function".
- One gram of Turmacin® provides 2.8% daily value of potassium



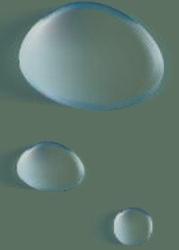
# Turmacin™

For functional beverages



## WATER SOLUBILITY

Unlike fat-soluble curcuminoid preparations, Turmacin® dissolves easily in water and stays in solution, avoiding the sedimentation problem



## TURMACIN® SOLUBILITY

# Turmacin™



### Dispersibility

0.1g of Turmacin® was dispersed in 100ml of water and stirred. Dispersed completely and evenly



### Solubility

0.1g of Turmacin® is 100% soluble in 100 ml of water. It was monitored after 3 hours, 6 hours, 10 hours and 24 hours



### Clarity of the solution

No turbidity was formed during the entire experiment



### Sedimentation

No sedimentation was found



# Turmacin™

## Non-staining of manufacturing equipment



### **Cleaning**

Easy cleaning of equipment

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### **Quick Cycles**

Quicker production cycles- Fewer cleaning shutdowns

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### **Saves money / Cost saving**

Saves money on maintenance

# Turmacin™

is GRAS

**GRAS**

**GENERALLY  
RECOGNIZED  
AS SAFE**

Turmacin® is approved for use  
in functional food & beverages  
at maximum levels of  
**316 mg** per day



# Turmacin™

HEALTH CLAIMS & DOSE

Dosage

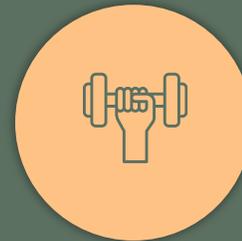
**500mg-1000mg**  
**per day**



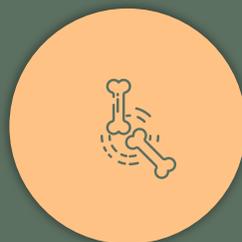
Helps to maintain healthy joint function\*



Supports joint mobility\*



Helps to reduce exercise induced joint pain\*



Improve joint comfort/ mobility during exercise or exertion\*



Delay the onset of joint discomfort during exercise or exertion\*

Disclaimer: \*These statements have not been evaluated by the Food and Drug Administration. This product is not intended to diagnose, treat, cure, or prevent any disease.

# Turmacin™

**21**  
Million

Doses Sold Till Date

INR/ USD

Cost Per Dose

# Turmacin™

Discover the power of water-soluble  
Turmerosaccharides®

## CERTIFICATIONS



clean  
label  
PROJECT®  
CERTIFIED

# WHY **Turmacin**<sup>TM</sup> ?

Self Affirmed GRAS  
(application in beverages)

Non-staining  
of Equipment

Water Soluble  
Naturally Bioavailable

Non-GMO Project  
Certified

Clean  
Label

Standardized to  
Turmerosaccharides<sup>®</sup> ;  
The bioactive  
polysaccharides

Backed by 4 clinical  
studies and exclusive  
study for Enhanced  
Performance (exercise)

Backed by 2  
human clinical  
studies for safety

Sustainable  
Supply Chain



# SCIENTIFIC PUBLICATIONS

Madhu et al. *Inflammopharmacology* 2013, 21(2):  
129-136

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Illuri et al. *Anti-inflammatory and Anti-allergy Agents in  
Medicinal Chemistry* 2015, 14(1): 53-62

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Chandrasekaran et al. *BioMed Research  
International* 2013, 2013: 158348, 10 pages

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Velusami et al. *Inflammopharmacology*. 2018 Jan 8.  
doi: 10.1007/s10787-017-0433-1.

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Anandakumar S, et al. Anti-Inflammatory effects of turmeric  
(*Curcuma longa* L.) extract on acute and chronic inflammation  
models. *J Korean Soc Food Sci Nutr*. 2014;43(4):612-17.

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Velusami CC, et al. Safety evaluation of turmeric polysaccharide extract:  
assessment of mutagenicity and acute oral toxicity. *BioMed Research  
International*. 2013. <http://dx.doi.org/10.1155/2013/158348>

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Senthilkumar et al. *Journal of Korean Society Food Science and  
Nutrition* 2014, 43(1): 612-617

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Chandrasekaran et al. *Pharmacognosy Research* 2013,  
5(2): 71-79

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Bethapudi et al. *Pharmacognosy Magazine* 2017,  
13(Suppl 3): S623-S627.

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Sasikumar et al. *Anti-Inflammatory & Anti-Allergy Agents in  
Medicinal Chemistry*, 2017, 16, 193-202

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Illuri R, et al. Anti-inflammatory activity of polysaccharide fraction of  
*Curcuma longa* extract (NR-INF-02). *Antiinflamm Antiallergy  
Agents Med Chem*. 2015;14:53-62.

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Murugan S, et al. Antiarthritic effect of polar extract of *Curcuma longa*  
on monosodium iodoacetate induced osteoarthritis in rats.  
*Antiinflamm Antiallergy Agents Med Chem*. 2017;16(3):193-202.

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# Turmacin™

EFFECTIVE • NATURAL • SAFE

## THANK YOU

Disclaimer: This is a business-to-business communication material and the statements used here have not been evaluated by any regulatory authorities. The ingredients mentioned here are not intended to diagnose, treat, cure or prevent any disease.