

# A Cross-sectional Study on the Prescription Pattern of Undenatured Collagen-II in Bangladeshi Patients

Md. Mahbubul Alam<sup>1</sup>, Md. Sakib Rayhan<sup>2</sup>, Arnob Ghosh<sup>1</sup> and  
A.S.M. Monjur-Al-Hossain<sup>1</sup>

<sup>1</sup>Department of Pharmaceutical Technology, Faculty of Pharmacy, University of Dhaka, Dhaka-1000 Bangladesh

<sup>2</sup>Department of Pharmacy, Faculty of Pharmacy, University of Dhaka, Dhaka-1000, Bangladesh

(Received: March 13, 2023; Accepted: June 4, 2023; Published (web): July 25, 2023)

## Abstract

Numerous clinical and experimental studies have shown that individuals with a variety of orthopedic diseases can get benefit from the undenatured form of type II collagen (UC-II). It has proved its efficacy and long lasting effectiveness for several orthopedic patients throughout different countries in the world. But in Bangladesh it is not frequently prescribed yet. Therefore, we made the decision to conduct a survey-based study to determine the number of patients prescribed with UC-II under which pathological conditions and to what extent they have got relief from their joint associated ailments. To conduct the study, we visited the orthopedic department of various hospitals in Bangladesh and with consent from patients we collected pictures of prescriptions as well as got overview regarding their complications. We gathered photographs of 252 prescriptions from orthopedic department patients, among which only 31 patients were prescribed with UC-II. According to this study, 40.47 , 32.54 , 15.47 , 9.12 and 2.38 % of patients were over the age group of 60 , 50 , 40 , 30 and 20 - years respectively. We found that a range of individuals with various orthopedic problems such as osteoarthritis, spondylosis, right tibial plateau, paresthesia in right upper limb and various bone fractures were advised with UC-II. However, we discovered only in 12.30% of prescriptions that the doctors prescribed UC-II, indicating this is a less common practice in Bangladesh in spite of its huge potential to recover joint pain associated complications.

**Key words:** Undenatured collagen-II, prescription, joint pain, orthopedic, osteoarthritis, spondylosis.

## Introduction

The most prevalent kind of degenerative and inflammatory joint diseases in both humans and animals are osteoarthritis (OA) and damages of synovial joints which eventually leads patients to impaired mobility (Hasan *et al.*, 2020). Several pharmaceutical therapeutic agents, certain medications and non-pharmacological preventive strategies may slow the progression of OA in animals. Additionally, numerous clinical and experimental researches have shown that patients with OA can get benefit from use of UC-II (Crowley *et al.*, 2009).

Collagen is a substance found naturally in skin and bone cartilage. Undenatured type II collagen

strengthens bones, muscles and joints by lubricating joints and assisting in the production of bone cartilage (Prabhoo *et al.*, 2018). Additionally, it enhances bone and muscle cell formation, which supports the body's natural musculoskeletal system. Because of the structure of this collagen fibrillar network, cartilage has the ability to both prevent proteoglycan aggregation and give surrounding tissue tensile strength (Goldring *et al.*, 2010). Treatment of arthritis may benefit from the development of oral tolerance to pathogenic immune responses with the oral administration of natural type II collagen (Bagchi *et al.*, 2002). It is a powdered, glycosylated, shelf-stable component of the dietary supplement majorly

**Corresponding author:** Md. Mahbubul Alam; Email: mahabub22@du.ac.bd  
and A.S.M. Monjur-Al-Hossain; Email: monjur.shiplu@du.ac.bd

DOI: <https://doi.org/10.3329/bpj.v26i2.67805>

sourced from the cartilage of chicken sternum. When collagen II isn't denatured the active epitopes of UC-II release regulatory T- lymphocytes that are unique to collagen by engaging with Peyer's patches (lymphoid tissue) in the small intestine during the oral tolerization process. Then, to prevent T-cell release, regulatory T-cells with a particular affinity for collagen relocate to the joint areas (Tong *et al.*, 2010). The enzyme collagenase is secreted by macrophages, which are in charge of degrading the collagen in joint cartilage, when T-cells are not released. It also lessens inflammation by lowering the production of inflammatory cytokines, which also prevents joint cartilage erosion and promotes cartilage regeneration (Fernandes *et al.*, 2002). Eventually, UC- II increases the range of motion in the knee and improves the flexibility, mobility and function of the joints as well as lessens joint pain brought on by strenuous exercise (Trentham *et al.*, 2001).

### Materials and Methods

We surveyed orthopedic department of several hospitals in Bangladesh and talked with patients about their problems and took photographs of their prescription with their consent. We collected 252 prescriptions. The data were comprehensively assayed with other prescribed medicines focusing on age group, gender based complication history, prescribing pattern of doctors for treating joint related complications with UC-II or other medications and finally level of wellbeing after first checkup while using UC-II as advised by health care professionals. All data were analyzed by using Microsoft Excel 2013.

### Results and Discussion

We collected 252 prescriptions from orthopedic department of different hospitals in Bangladesh and found that, patients were suffering from different musculoskeletal problems such as osteoarthritis (44.84 %), spondylosis (32,14 %), right tibial plateau (2.77 %), paresthesia in right upper limb (1.19 %) and bone fracture (19.04 %) (Figure 1). From the study we also found that, most of the patients were female

(130 prescriptions out of 252) who were suffering from musculoskeletal complications where, 32.14, 16.67, 1.19, 0.79 and 10.71% of female patients were suffering from osteoarthritis, spondylosis, right tibial plateau, paresthesia in right upper limb and fracture whereas 12.69, 15.47, 1.58, 0.39 and 8.33% of male patients were suffering from the above mentioned complications respectively (Figure 2).

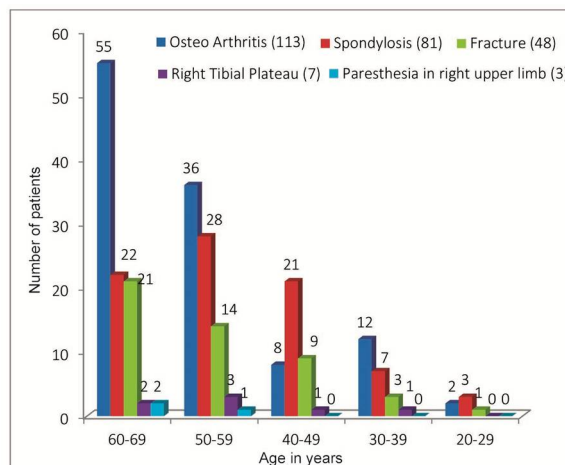


Figure 1. Age group distribution of patients having musculoskeletal complications.

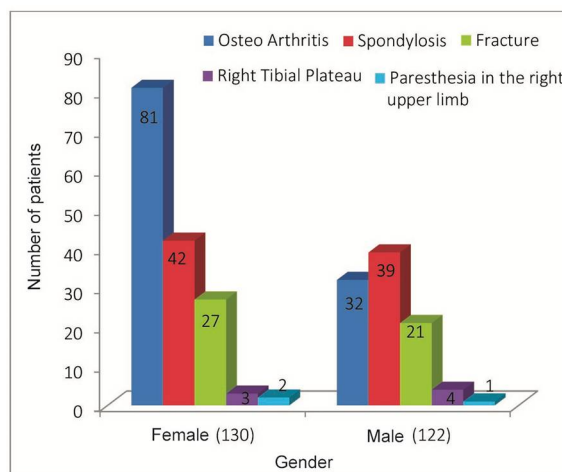


Figure 2. Gender-based distribution of patients having musculoskeletal complications.

Prominently, patients who were above 60 years of old were prescribed with UC-II for several types of musculoskeletal ailments. In the study we observed

41.93, 32.25, 16.12, 6.45 and 3.22 % of patients above the age group of 60 , 50 , 40 , 30 and 20 - years prescribed with UC-II respectively (Figure 3).

From the study, we noticed that, most of the patients were female who were prescribed with UC-II (Figure 3) since they were the most vulnerable group for joint related complications.

Furthermore, we observed that only in 12.30% prescriptions (31 out of 252) the doctors prescribed UC-II to treat osteoarthritis (5.95 %), spondylosis (4.36 %), right tibial plateau (0.79 %), paresthesia in right upper limb (0.39 %) and fracture (0.79%). Whereas, to treat OA the use of UC-II was found to be the most abundant 48.38% (15 out of 31 prescriptions) (Figure 4).

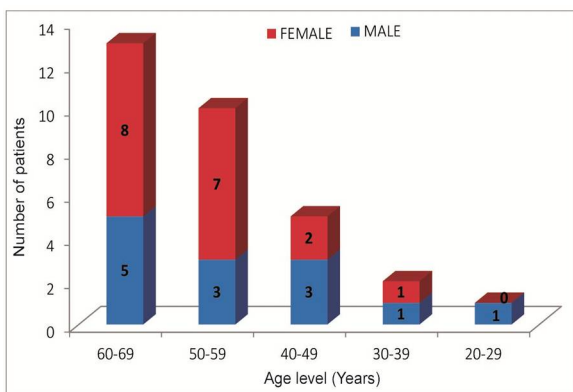


Figure 3. Age and gender-based distribution of patients prescribed with UC-II.

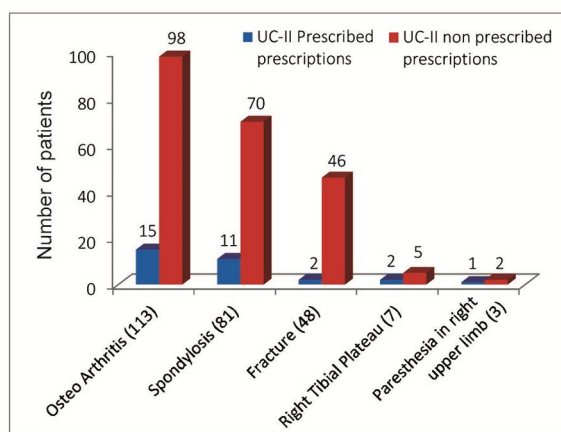


Figure 4. Prescriptions with or without UC-II in patients having musculoskeletal complications.

It was also found that UC-II was prescribed in combination with vitamin-D & calcium in 24 prescriptions, glucosamine sulfate & chondroitin in 16 prescriptions, aceclofenac & antacid in 13 prescriptions, curcuminoiden in 13 prescriptions and naproxen & antacid in 11 prescriptions (Figure 5), which paved a way to analyze the interaction profile of UC-II to these medications and common food nutrients in further research. Additionally, our study found that, non-steroidal anti-inflammatory drugs like naproxen and ibuprofen were used in 139 prescriptions, which is pernicious for kidney functionality in geriatric patients. Also opioid analgesis like tramadol was used in 17 prescriptions (Figure 6).

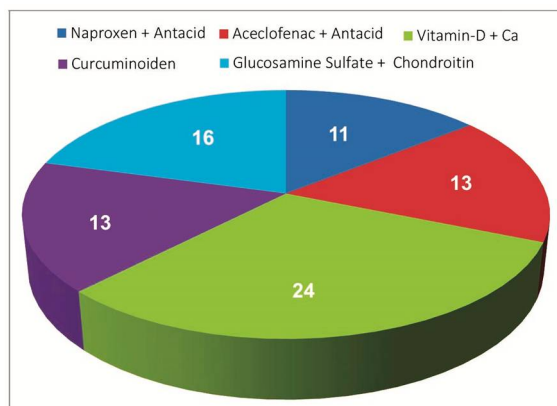


Figure 5. Patients prescribed with UC-II and other medications.

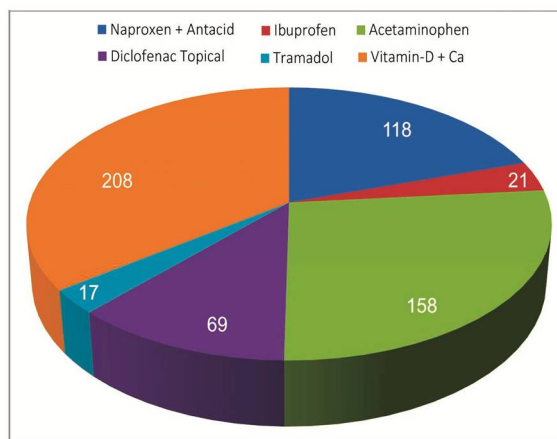


Figure 6. Patients prescribed with other medications without UC-II.

However, the tendency of prescribing UC-II was found gradually decreasing in follow-up visits because of the gradual improvement in the level of wellbeing in patient who took UC-II as prescribed by the healthcare professionals (Figure 7).

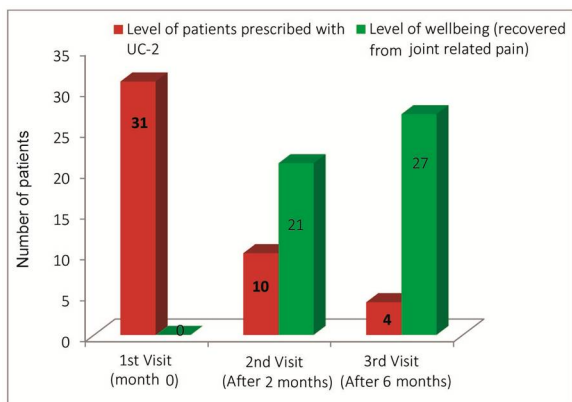


Figure 7. Level of wellbeing in patients prescribed with UC-II during follow-up visits.

### Conclusion

UC-II is an important medication for several musculoskeletal problems, which is categorized under the nutraceuticals class. This study was designed to find out the prescription pattern of UC-II and other commonly prescribed medications among various age group patients having musculoskeletal complications and eventually find out their level of wellbeing after the second or third visits while having UC-II as prescribed.

From the overall study we have found that, in spite of the huge potential of UC-II to alleviate joint pain associated complications, the practice of prescribing UC-II is limited in Bangladesh. Also very few (only four) pharmaceutical companies are manufacturing this medicine right now. So there is a huge scope for pharmacists to develop formulations of UC-II and bring this medicine in practice by health care professionals to assuage joint pain invaded patients and eventually restoring quality lifestyle.

In this study, orthopedic department of all hospitals of Bangladesh could not be covered but the results we have obtained is the resemblance of prescribing practice of UC-II throughout the country.

### Acknowledgement

The authors are thankful to the hospital authority for their co-operation and support to carry out this cross sectional research. In addition, they are thankful to Centennial Research Grant (2<sup>nd</sup> Phase), University of Dhaka (Grant approval No.: Regi/Admin-3/70931, 24.04.2022) to provide financial support to conduct this study.

### Authors' contributions

Generation and supervision of this survey work was conducted by Md. Mahbubul Alam. Md. Sakib Rayhan and Arnob Ghosh did the field work of collecting prescriptions with active instructions from Md. Mahbubul Alam. Graph preparation through Microsoft Excel 2013 was performed by Md. Mahbubul Alam and Md. Sakib Rayhan. The draft of this manuscript was prepared by Md. Mahbubul Alam, Md. Sakib Rayhan and A.S.M. Monjur-Al-Hossain and was finally approved by Md. Mahbubul Alam.

### Conflict of interest

The authors declare no conflict of interest.

### References

- Bagchi, D., Misner, B., Bagchi, M., Kothari, S.C., Downs, B.W. and Fafard, R.D. 2002. Effects of orally administered undenatured type II collagen against arthritic inflammatory diseases: a mechanistic exploration. *Int. J. Clin. Pharm. Res.* **22**, 101-10.
- Crowley, D.C., Lau, F.C., Sharma, P., Evans, M., Guthrie, N. and Bagchi, M. 2009. Safety and efficacy of undenatured type II collagen in the treatment of osteoarthritis of the knee: a clinical trial. *Int. J. Med. Sci.* **6**, 312- 321.
- Fernandes, J.C., Martel-Pelletier, J. and Pelletier, J.P. 2002. The role of cytokines in osteoarthritis pathophysiology. *Biorheology* **39**, 237-246.
- Goldring, M.B. and Goldring, S.R. 2010. Articular cartilage and subchondral bone in the pathogenesis of osteoarthritis. *Ann. N. Y. Acad. Sci.* **1192**, 230-237.

- Hasan, G., Cemal, O., Emre, S. and Kazim, S. 2020. Undenatured type II collagen (UC-II) in joint health and disease: a review on the current knowledge of companion animals. *Animals* **10**, 697-720.
- Prabhoo, R. and Billa, G. 2018. Undenatured collagen type II for the treatment of osteoarthritis: a review. *Int. J. Res. Orthop.* **4**, 684-689.
- Tong, T., Zhao, W., Wu, Y.Q., Chang, Y., Wang, Q.T., Zhang, L.L., and Wei, W. 2010. Chicken type II collagen induced immune balance of main subtype of helper T cells in mesenteric lymph node lymphocytes in rats with collagen-induced arthritis. *Inflamm. Res.* **59**, 369-377.
- Trentham, D.E, Halpner, A.D., Trentham R.A., Bagchi, M., Kothari, S., Preuss, H.G. and Bagchi, D. 2001. Use of undenatured type II collagen in the treatment of rheumatoid arthritis. *Clin. Pract. Alter. Med.* **2**, 254-259.