

The clinical research took place at the hospital by Medical University in Hanoi in Vietnam

Study of features of knee osteoarthritis and assessment on effectiveness of oral hyaluronic acid in knee osteoarthritis treatment for the elderly with diabetes.

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4.4. The effect of hyaluronic acid (HA) for oral intake in knee OA treatment of type 2 diabetes elderly patients.

To evaluate the effect of HA in knee OA treatment for type 2 diabetes patients, we selected two type 2 diabetes groups which have knee OA. They all have nearly same paraclinical and clinical feature (table 3.16), 100% patients have knee OA in Kellgren stage 2. In this study we used the Womac index to assess pain, stiffness and range of knee motion.

4.4.1. Evaluate the effect of treatment through joint pain levels

Joint pain is usually the first clinical symptom of OA. The pain has mechanical properties which means the feeling of pain when moving and reduced after resting. In first stage, patients will feel pain when they carry heavy things, climb stairs, stand up or sit down and squatting... the pain levels increased after that. Patients may feel knee pain in movement, walking on the normal road and even in resting time. Patients may feel pain naturally, after walking a distance or start moving, more severe pain make the patient have to use crutches. Womac index was used to evaluate the pain levels stiffness and range of knee joint motion. At the beginning of study (T0), the average pain level of patients in HA group is 8.5 ± 3.5 points, the control group is 8.7 ± 3.8 points. There is no difference in pain level between 2 groups ($p = 0.634$).

Table 3.19 shows that at the beginning of the study, the level of pain, stiffness and motor functions of the two groups is the same with $p > 0.05$. The degree of pain was significantly improved in the HA group (Table 3.19) after the first month (from 8.5 ± 3.5 to 4.4 ± 2.8 decreased with $p < 0.05$) and was maintained within 2 months (average pain intensity in this group is 3.7 ± 2.6).

The Table 3.20, Chart 3.5 shows that the average pain level decreased significantly in HA group and the differences compared with control group with $p < 0.05$. The level of pain among patients with HA decreased 47.8% compared with 8.6% in the control group after one month decreased 55.7% compared to 14.1% in the 2nd month. Number of patients with improved symptoms is 85.7% in HA groups while in the other group only 50% of patients have decreased pain.

4.4.2. Assessment on effectiveness via signs of stiffness and pain

Sign of stiffness and pain in joints is a common symptom in OA especially in knee OA, it often occurs when waking up or when warming up after a long rest, the patients often have difficulties in moving but after a few moves, the signs start losing. According to the results of our study, the level of Sign of stiffness and pain in joints was assessed by Womac B. At the start of the study, the average score of the 2 groups was: 1.4 ± 1.7 (in HA group) and 1.2 ± 1.5 (control group), there is no difference between the 2 groups with $p = 0.806$.

The results in Table 17.3 shows signs of stiffness and pain in joints were significantly improved in patients taking HA with average Womac B from 1.4 ± 1.7 (T0) to 0.5 ± 0.9 (T1), down 60.9%, reduced to 0.4 ± 0.7 at the time T2, down 73.9%

Table 3.20 and 3.21 shows the average Womac B of two groups after 1 month of treatment without difference (0.5 ± 0.9 and 0.9 in intervention group, ± 1.5 in control group) with $p = 0.137$. But after the 2nd month, the Womac B changed: 0.4 ± 0.7 in the intervention group compared with 1.0 ± 1.2 (p -value = 0.026). Chart 3.6 also shows the change in the intervention group: decreased 1.0 points after 2 months of treatment, whereas in the control group: only 0.2 points.

4.4.3. Assessment of effectiveness via treatment of motor function of knee joint

Limited knee motion in knee OA is often due to various factors such as pain, loss in quality and quantity of hyaluronic acid molecules in joint fluid (leading to decreased function of fluid such as lubricating properties, elasticity...), inflammation of the synovial membrane, including joint injuries, cartilage loss, joint space narrowing. Motor function of the joint is evaluated through the ability of walking, climbing stairs, squatting, shopping, up and down and so on is one of the criteria of Womac C. At the start of the study (T0), average Womac C of 2 groups did not differ (intervention group was 35.6 ± 14.4 , control group was 29.4 ± 12.7) with $p = 0.105$. The results in Table 18.3 showed the motor function of the knee joint of the intervention group was significantly improved is reflected in the decline from 35.6 ± 14.4 Womac C at the start of the study (T0) to 21.6 ± 12.7 after 1 month of treatment (T1) and 20.4 ± 12.3 after 2 months (T2) with $p < 0.05$.

In table 3.20 and 3.21, the result showed the average Womac C of the two groups after the 1st and 2nd month without difference with $p = 0.109$ (T1), $p = 0.078$ (T2). But look at the chart 3.6 Womac C fell in the intervention group and control group without difference. Womac C in the group that uses HA decreased from 35.6 ± 14.4 to 21.6 ± 12.7 , reduced by 14.1 (down 39.4%) compared with control group: reduced 3.0 (10.2%) at T1, it continues down 1.2 at T2 (ie, declining 42.2%) while the control group decrease 0.4 (ie 11.4%). Thus, although the two groups of Womac C at 2 times T1, T2 have no difference, the intervention group tended to reduce the Womac C than the control group.

4.4.4. Evaluating the effect of treatment by general WOMAC

Pain of OA is known by many mechanisms such as inflammation of the synovial membrane, joint bursitis, stretch of nerve endings in the periosteum because of stylosteophyte, small bone cracking under the cartilage brings the irritation. Pain and changes of structure in OA lead to the decrease of joint's range motion. Moreover, the damage of cartilage, the reduction of synovial fluid, inflammation of capsular ligament, synovial membrane and the degeneration around the joints show the symptoms of morning stiffness. Patients become disabled in many cases. Womac index was used to evaluate the pain levels, knee stiffness and range of knee joint motion. At the beginning of research, there is no difference in total average Womac index of 2 groups (47.6 ± 18.3 in intervention group, 39.3 ± 16.2 in control group) with $p = 0.242$.

The results in table 3.17 shows that the average Womac index of HA group after the first month was decreased significantly (from 45.6 ± 18.3 in T0 down to 26.4 ± 17.0 in T1), about 42.0% compared with the beginning time and it continues to decrease about 46.1% after the second month. Compared with the control group in table 3.22, the average Womac index of intervention group was lower than control (35.0 ± 14.3) has the statistically significant with $p = 0.037$. Compared with control group at T2, our result show that the total average Womac index of intervention group is lower than control group (24.5 ± 14.8 in HA group and 34.7 ± 14.0 in control group) has statistically significant with $p = 0.011$. The result in Figure 3.8 shows that the average Womac index in intervention group was decreased and it was more clear than control group. After the first month, the average Womac index of intervention group decreased 18.2 points (42%) while the control group was 4.3 point (10.8%). After the second months, the average Womac index of intervention group continues to decrease 1.9 point again (it means 46.1% compared to T0) and control group decreases 0.3 point (11.7% compared to T0).

4.4.5. Evaluating the effect of HA to blood glucose control

Blood Glucose Control (BGC) still is a challenging problem for the therapist. To be on the diet, exercises and having medicine everyday are not always seriously and fully taken by the patients. This has been demonstrated in patients with type 2 diabetes when they have joints problem. Therefore doing exercises and drug therapy will become more difficult for patients. According to research by Reginster JY [65], high doses of glucosamine treatment will affect blood glucose. The problem here is: type 2 diabetes patients who have knee arthrosis used HA affect blood glucose of patients or not? The results in Table 3.22 showed there is no difference in HbA1c, fasting glucose, blood glucose after 2 hours of eating between groups who used HA after and before the treatment with $p > 0,05$.

4.4.6. Unexpected effect of HA

During researches, we found that two patients withdraw from the study: 1 patient with mild allergic manifestations in the form of itching or rash on the skin, this stopped after patients stopped all medications a day, this patient has a medical history of allergic with honey so this issue can be caused by components of honey in the HA product; 1 patient gained weight after 2 weeks of drinking HA (increase of about 2 kg). The remaining patients did not show any adverse reactions.