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IMPACT OF GLUCOSAMINE SUPPLIMENTATION ON PEOPLE EXPERIENCING REGULAR KNEE PAIN

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Abstract:

Background: *Frequent knee pain affects approximately 25% of adults, limits function and mobility, and impairs quality of life among adults around the world.*

Objective: *To examine the effects of oral glucosamine supplementation on the functional ability and degree of pain felt by individuals who had regular knee pain.:* ***Methods:****This prospective, comparative cohort was carried out at Muhammad Medical College Hospital, Mirpurkhas from January 2016 to June 2018 on a sample of 84 patients presenting to the orthopedic outpatient department with complaint of regular knee pain (chosen via non-probability, consecutive sampling) aged 40 years and above. After taking written informed consent, patients were divided into two groups of 42 subjects each and administered either glucosamine or placebo (lactose). Data was collected using a self-structured questionnaire for sociodemographic details, the Knee Pain Questionanire (KPQ). Observations and expert evaluations were also noted. The data obtained was analyzed using MS. Excel 2013 and SPSS v. 21.0.*

Result: *Among the subjects enrolled into the study, 52 were females while 32 were males. The mean B.M.I for females stood at 28.7 and 25.3 for males. The subjects reported with a mean (pre-intervention) KPQ score of 51 and a mean KPQ (post-intervention) of 21 for glucosamine group and 29 for placebo group.*

Conclusion:*After carefully considering the results, it can be concluded that both groups experienced significant improvement in knee function and pain. Thus whether the difference was brought about by intervention or just time may be explored in future research.*

Keywords: *Knee Pain, Osteoarthritis, Glucosamine, Pain Relief and Knee Function.*

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INTRODUCTION:

Knee pain is a common musculoskeletal problem in elderly, and its prevalence increases with age. Knee pain leads to physical disability and decreased quality of life (QOL). Osteoarthritis (OA) is a leading cause of knee pain and physical disability in the elderly, and knee pain derived from OA is a key symptom influencing the decision to seek medical attention. **[1]** Osteoarthritis is one of the leading causes of disability in the elderly of the developed world. The epidemiological study of OA is complex, as prevalence varies greatly depending on the location of OA, the definition criteria utilized, and the sample selection. Studies from many countries have estimated the prevalence of OA at several body sites by radiographic criteria. However, a radiographic definition of OA for epidemiological purposes may magnify the problem, since there is an uncoupling between radiological and clinical findings in OA. **[2]**

In this way, many patients presenting with intense pain and disability may hardly show any finding in plain x-ray, while others with clear signs of joint derangement on radiology, may have few or no symptoms. The strongest determinant for knee replacement, a highly meaningful outcome for Public Health, is the degree to which pain and disability affect the lives of patients, and not merely the radiographic status of the knee. **[3]**

Under normal circumstances, pain is a warning that something is wrong: pain from touching a hot stove, having injured a joint, or chest pain due to ischemia, for example. In these instances, pain plays a protective role, signaling to the individual to withdraw from the threat, rest to allow tissue healing, or seek help, etc. However, once its warning role is over, persistence or continued pain, i.e., chronic pain, is considered maladaptive. **[4]**

Unlike many other pain conditions in which the underlying injury typically heals or resolves, OA is a disease that does not resolve. Thus, OA is typically accompanied by chronic pain. Because effective treatment for OA and its related pain is not available to date, and the disease can be present for decades, the public health impact of OA is substantial on an individual and societal level. In recent estimates of global years lived in disability, musculoskeletal-related conditions ranked second, with low back pain, neck pain, and knee OA being the three most common such conditions, and knee OA itself ranked within the top 10 non-communicable diseases for global disability-adjusted life years (i.e., years of life lost and years lived with disability. **[5]**

Thus finding a cure is important. Commonly, analgesics and anti-inflammatory agents are used in the management of OA. Recent studies have also indicated that glucosamine, an amino sugar which is produced by the body, can provide relief from arthritic pain related symptoms. A natural substance found in the body, glucosamine is formed by the combination of glucose and glutamine. It is found primarily in cartilage and plays an important role in its health and resilience. **[6]**

Joint cartilage contains a group of protein molecules called proteoglycans and these proteins make up what is known as the “ground substance” of the cartilage. Many researchers believe that joint cartilage is constantly rebuilding itself; such that as old or damaged cartilage degenerates, it is replaced by new healthy cartilage. Glucosamine, in the form of glucosamine sulfate or hydrochloride, has been shown to regenerate cartilage and to exhibit some anti-inflammatory effects. Glucosamine supplementation may be a potential treatment for degenerative joint disease by limiting further degeneration and promoting tissue repair. **[7]**

Several studies have been conducted examining the effect of glucosamine supplementation on knee pain. Although there are controversies, most studies have supported the use of this supplement in the treatment of osteoarthritis, although they have recently been criticized for insufficient subject numbers, the low dosage and duration of supplementation and the lack of inclusion of functional tests. **[8]** Therefore, the purpose of this study was to examine the effects of eight weeks of glucosamine supplementation (2000 mg per day) on the functional ability and the degree of pain experienced by individuals who have regular knee pain.

METHODOLOGY:

This prospective, comparative cohort was carried out at Muhammad Medical College Hospital, Mirpurkhas from January 2016 to June 2018 on a sample of 84 patients presenting to the orthopedic outpatient department with complaint of regular knee pain of un-specified origin (chosen via non-probability, consecutive sampling) aged 40 years and above. After taking written informed consent, patients were divided into two groups of 42 subjects each and administered either glucosamine (2000 mg daily) or equal dosage of placebo (lactose).

Each subject was required to attend four test sessions spaced two weeks apart over the eight week period. In each of these sessions, both clinical and functional tests were conducted along with completion of the

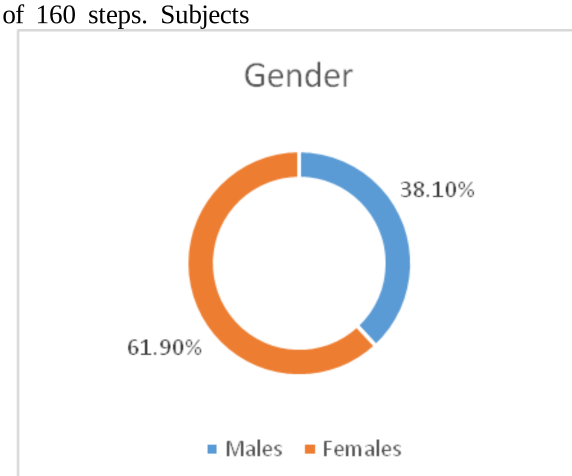
KPQ. Perceived pain was rated by using a 10 point Likert perceived pain rating scale (0 = no pain; 10 = excruciating pain). At each of the four assessment sessions, subjects were asked to complete the following tasks to assess the severity of their current knee pain, the KPQ, joint line palpation (conducted by the experimenter) of both knees, “duck walk” for 3 m and a stair climb of 32 steps (16 up and 16 down) repeated up to five times.

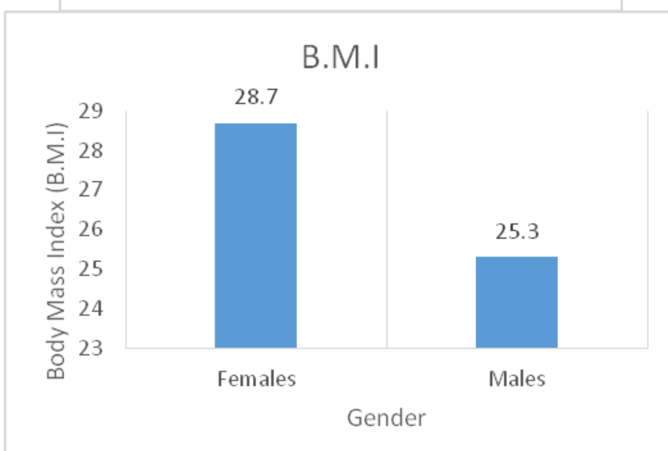
The joint line palpation was used as a means of measuring the pain on palpation of the articular or meniscal cartilage. The “duck walk” over a 3 m set distance followed the joint line palpation. The same 3 m floor area was used at all test sessions. The “duck walk” was used as a component of the functional tests because it allows maximal load to be placed on the knee joint and results in compression of the menisci and joint surfaces. The stair climb involved climbing 32 steps (16 up and 16 down) repeatedly for up to five times, for a total of 160 steps. Subjects were not permitted to use hand rails when ascending or descending the stairs.

The same set of stairs was used at each session. This functional test was used to assess knee joint pain, as climbing stairs loads the knee joint both concentrically and eccentrically, and often elicits knee pain. Subjects were asked to rate their perceived pain after each test using the 10 point Likert scale on the injured knee. Data was collected using a self-structured questionnaire for sociodemographic details, the Knee Pain Questionanire (KPQ). Observations and expert evaluations were also noted. The data obtained was analyzed using MS. Excel 2013 and SPSS v. 21.0.

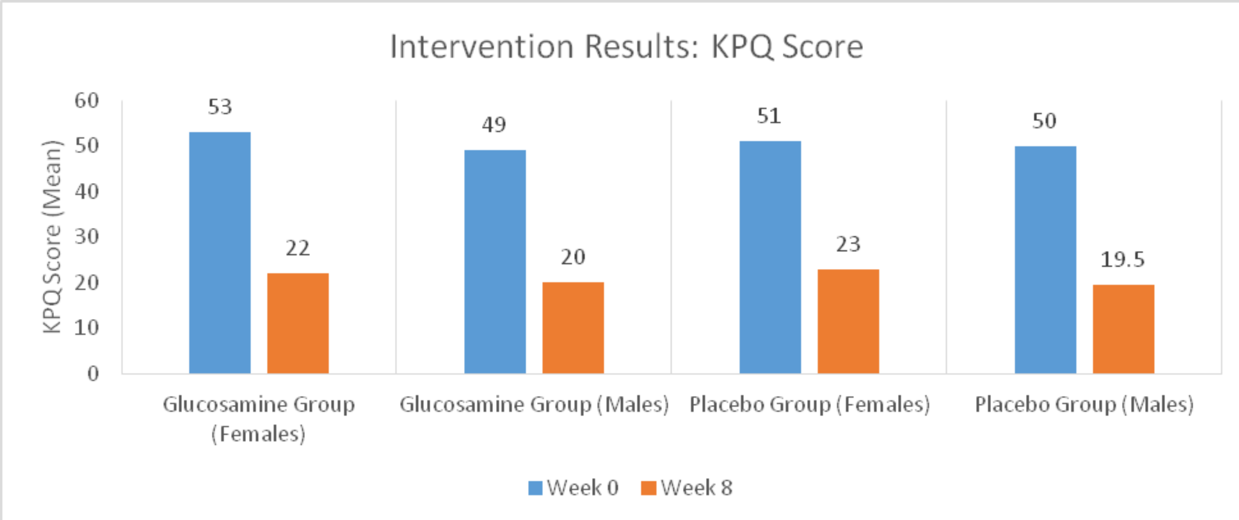
RESULTS:

Among the subjects enrolled into the study, 52 were females while 32 were males. The mean B.M.I for females stood at 28.7 and 25.3 for males.

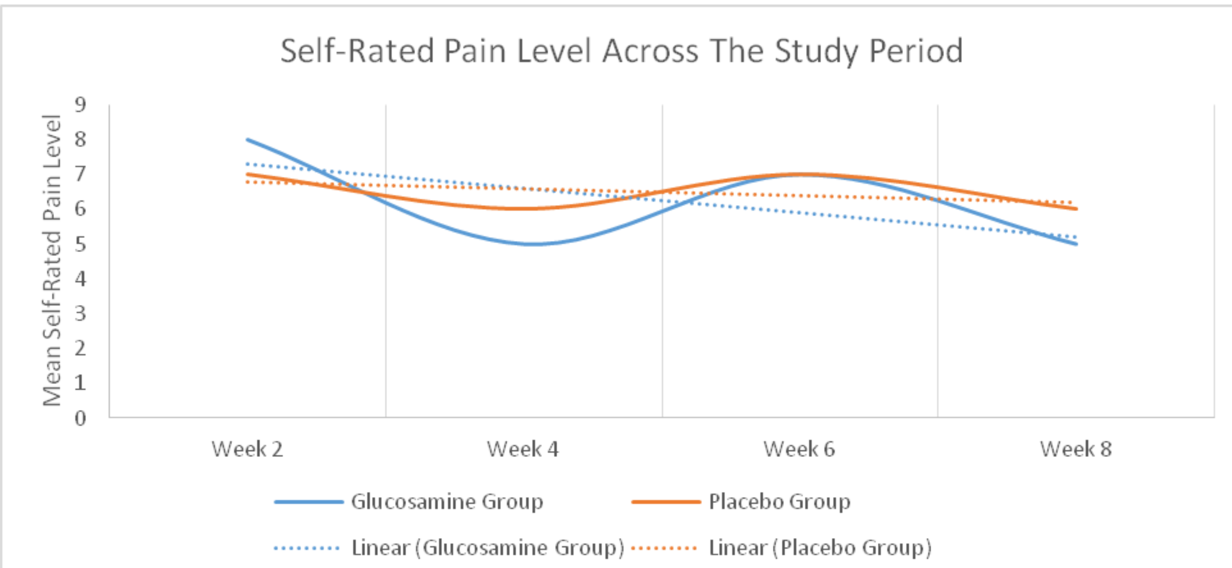




The subjects reported with a mean (pre-intervention) KPQ score of 53 for females and 49 for males and a mean KPQ (post-intervention) score of 22 for female and 20 for male glucosamine group. The mean KPQ score for placebo group was 51 for females and 50 for males (pre-intervention) and 23 for females and 19.5 for males (post-intervention).



The self-rated pain too decreased over the weeks in both groups. But the differences were less significant than KPQ score.



DISCUSSION:

Our study differed from previous investigations in that, firstly, the supplementation of glucosamine was for a period of eight weeks, whereas subjects have usually only been supplemented with glucosamine for between four and six weeks. Only one investigation has used a longer supplementation period (five months) and while the results were generally positive, no control group was used in the experimental design, limiting the interpretation of the data. **[9]**

The results of these earlier studies did also suggest that a longer time frame of supplementation may prove to be more beneficial. Secondly, our study also incorporated some simple clinical and functional tests (besides subjective or self-report assessments) to evaluate improvements in pain with supplementation, as these types of test have not been used as part of the assessment procedures in previous studies. Thirdly, the supplementation amount chosen for use in our study was 2000 mg, larger than the majority of previous glucosamine studies. Earlier studies have used supplementation levels of between 450 mg and 3000 mg daily, and it was reported that a higher dosage of supplementation is well tolerated by subjects. Qualitatively, our study supported the findings of many reports which have suggested that glucosamine supplementation provides some degree of pain relief and improved mobility to subjects who experience regular knee pain which may be due to cartilage damage and possibly OA. **[10]**

Subjectively, majority (85.71%) of the G subjects (and only 42.857% of P subjects) self-reported pain and mobility improvements over the supplementation period. These self-reported changes also indicated that the majority of benefits occurred between week four and eight of supplementation, as reported by several other studies. **[11]**

In our study we incorporated some simple functional and clinical tests, in order to provide some more objective data on the effects of the G supplementation. Most previous studies have only reported on the subjective perceptions of pain of the subjects, although some11 15 have recorded pain ratings after walking. However, the joint line palpation, “duck walk”, and stair climb results did not produce any significant group interactions across the eight week supplementation period, therefore no evidence of a positive effect of the glucosamine on the functional ability and palpated pain responses was provided by these tests. **[12]**

Whether the tests chosen here are sufficiently discriminating to isolate any effects that glucosamine may have on knee cartilage integrity and pain on loading is not known, and awaits further research; perhaps in conjunction with radiological assessment of cartilage integrity before and after a period of glucosamine supplementation. Future research should also consider the assessment of pain and functional ability on consecutive days (rather than just on a single day) at regular intervals over a supplementation period, as, in many of our subjects, pain did not manifest immediately after exertion (such as the “duck walk” or stair climb), but was present several hours later or on the next day. **[13]**

This experimental design may assist in the gathering of more objective data about the effects of glucosamine supplementation on knee pain which may be associated with OA. Nevertheless, the KPQ scores did show some differences between the G and P groups, with the G subjects reporting lower KPQ scores at week eight. These results may reflect more general improvements in pain and functional ability in the G group over the whole of the supplementation period, rather than any acute effects noted during the assessments. **[14]**

Our study also used a large (2000 mg) daily dose of glucosamine and a lengthy (eight weeks) period of supplementation, in contrast to other research, although these studies have also reported some (although not comprehensive) positive effects of glucosamine supplementation on knee pain and arthritis symptoms, when compared to placebo treatment. **[15]**

CONCLUSION:

After carefully considering the results, it can be concluded that both groups experienced significant improvement in knee function and pain. Thus whether the difference was brought about by intervention or just time may be explored in future research.

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