

# Possibilities of Regular Physical Culture Lessons in Restoring the Functional Status of Students

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Received: 25 March 2021 / Received in revised form: 08 June 2021, Accepted: 09 June 2021, Published online: 21 June 2021

## Abstract

The high level of development of modern medicine cannot reduce the growing prevalence of various types of pathologies and injuries in people of different ages. Recently, a fracture of the lower jaw is often found among student youth. In this regard, the issue of improving the rehabilitation of young people with this type of injury is relevant. The importance of this problem is associated with the high frequency of such an injury and the increase in the number of complications developing against its background in the head and neck region. Despite the efforts of medicine, these patients still have a high risk of developing persistent jaw dysfunction and the danger of maintaining a "cosmetic defect" throughout their lives. Regular physical education should be of great importance in the development of rehabilitation options for a fracture of the lower jaw. It provides a good healing effect, especially when combined with several physiotherapeutic and psychotherapeutic effects. However, there is still a need to accelerate the rehabilitation process and increase its effectiveness after a fracture of the lower jaw, which requires the search for new directions for further scientific research on this issue.

**Keywords:** Fractures, Lower jaw, Physical culture, Rehabilitation

## Introduction

In developed countries, despite the advances in medicine, there is a high prevalence of various types of pathology in people even at **Vladimir Yurevich Karpov, Svetlana Yuryevna Zavalishina\*, Natalia Nikolaevna Marinina**  
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a young age (Amelina & Medvedev, 2009; Nikitin *et al.*, 2017; Almazroea *et al.*, 2019; Suhluli *et al.*, 2019). Systematic scientific research is aimed at inhibiting the growth of the prevalence of diseases and limiting the development of complications and their consequences (Isaikin & Smirnova, 2017).

Unfortunately, the pathological burden among the young population remains very high due to the high frequency of accidents in everyday life and at work. At the same time, among patients with bone injuries, the frequency of occurrence of fractures of the lower jaw is high (Abdrashitova & Saleev, 2018). The number of such patients in the general structure of patients with skeletal fractures is about 8% (Dzhambaeva, 2016).

A fracture of the mandible is a rather complicated pathology in terms of rehabilitation. In the area of injury, serious changes occur, caused by a change in the integrity of the bone and intoxication due to autolysis of necrotic tissues. The consequences of a fracture of the lower jaw often lead to significant disturbances in the work of both jaws. Very often, with this pathology, a pronounced cosmetic defect is noted, leading to severe psychological changes in the patient. In this regard, for the success of rehabilitation in this category of patients, the earliest possible onset of effective health-improving effects is required (Malikova, 2016; Bepalov *et al.*, 2018b). The high incidence of fractures of the lower jaw in college students makes the problem of continuing to improve approaches to the rehabilitation of this category of patients even more acute. This is due to a violation of the professional training of students with a fracture of the lower jaw, which sometimes leads to a revision of their future profession and the termination of their studies at the university (Nikitin *et al.*, 2017).

The purpose of the study is to summarize and critically interpret the known information about physical rehabilitation after the postponed fracture of the lower jaw.

## Materials and Methods

The material for this study was the sources of information contained in the open press. The search was carried out in the database of the scientific electronic library eLIBRARY.RU and the Scopus database. The research methods in this work were methods of analysis and synthesis, induction, and deduction.



## Results and Discussion

In recent years, there has been a high incidence of lower jaw fractures among students. This increases the attention of medical science to the issue of rehabilitation of this contingent of patients and reducing the consequences of this injury (Bespalov *et al.*, 2018a).

Prolonged limitation of motor abilities, prolonged immobilization of the lower jaw, scarring in the area of injury can lead to contractures of the lower jaw, and impairment of movement in the temporomandibular joint. The severity of such disorders is directly related to the features of the fracture (Nasyrova & Bogovskaya, 2016).

The main goal of all rehabilitation of patients with a fracture of the mandible is to achieve the integrity of this bone and normalize its function (Glagoleva & Medvedev, 2020).

During the first 4 days after the fracture of the lower jaw, as a rule, a semi-bed regime is prescribed. Then a free motor regime is prescribed. From the very beginning, the doctor develops a program for the individual rehabilitation of the patient. According to this program, a person is engaged in physical education at home, visiting a doctor once a week to assess the dynamics of his condition (Karpov *et al.*, 2020). Four days after the immobilization, physical culture classes are recommended in a sparing mode. In the case of a serious condition of the patient, at high body temperature, in the presence of a strong inflammatory process in the area of injury, they temporarily refrain from physical education (Karpov *et al.*, 2018).

In the absence of contraindications in patients with fractures of the lower jaw, physical education should be recommended. They significantly improve the general condition of the patient, minimize the occurrence of complications caused by immobilization of the mandibular joint, activate the fusion of bone fragments, and stimulate the restoration of jaw function. The sooner it starts to be applied, the more completely it will be possible to restore the structure and function of the lower jaw (Makhov & Medvedev, 2018a).

At each physical training session in such patients, general developmental and breathing exercises with a rational dosage should be used to ensure the optimum reparative processes in the injury zone. The mode of application of general developing and respiratory exercises in each patient is associated with the current functional state of the whole organism and especially the respiratory and circulatory systems (Kugushev & Lopatin, 2017).

It is especially indicated for fractures of the mandible to use exercises for the chewing and facial muscles, aimed at eliminating the consequences of injury. This helps to restore the joint work of the muscles that implement swallowing, chewing, and speech (Mal *et al.*, 2018a). The functional activity of the masticatory muscles is stimulated when using rational therapeutic physical culture after fractures of the lower jaw. In the case of single-jaw splinting without an intermaxillary joint, the patient can make weak

movements of the lower jaw on the second or third day. In this case, exercises are used that stimulate facial muscles and local blood circulation, normalizing the tone of the masticatory muscles (Medvedev, 2018a). In conditions of double-jaw splitting, exercises for the masticatory muscles are used after the termination of immobilization (Mal *et al.*, 2020).

In the absence of acute inflammatory processes at the site of the fracture on the eighth day, you can do a facial massage. The effect of it is associated with the activation of their receptors in the muscles and ligaments, which are excited during the massage. This stimulates blood circulation in the muscles and enhances the function of the entire neuromuscular apparatus in the zone of massage action (Medvedev, 2018b).

Seven to ten days after the fracture, therapeutic exercises should include general strengthening exercises that extend to the respiratory and facial muscles, as well as muscles shoulder girdle. Such exercises can restore the symmetry of the movement of the lower jaw. The therapeutic gymnastics procedure should last about 20 minutes per day. Exercises aimed at increasing the mobility of the mandibular joint must be used (Mal *et al.*, 2018b).

The functional load on the mandibular joint can be increased by using individual tasks in patients, consisting of special exercises 7-10 times a day (Uklonskaya & Agaeva, 2017). At the end of immobilization, when a full-fledged bone tissue has already appeared at the site of the fracture, it is possible to expand the applied rehabilitation effect, which can ensure a complete return of a person to work (Karpov, 2018; Medvedev, 2018c).

For this purpose, such patients are recommended breathing and restorative exercises that strengthen the cardiorespiratory system, taking into account the existing state of the patient's body. In the course of regular muscle activity in patients, microcirculation improves, the work of the cardiovascular and respiratory systems is stimulated. In the course of gymnastics, a set of breathing, restorative and special exercises should be used with a gradually increasing intensity of the load (Medvedev, 2018d).

At this stage of rehabilitation after a fracture of the lower jaw, general strengthening physical exercises and special ones should be alternated. In the composition of therapeutic gymnastics, first general strengthening, and then breathing exercises for all parts of the body are introduced to increase overall fitness and improve efficiency (Oshurkova & Medvedev, 2018a; Glamazdin *et al.*, 2021).

Regular muscle training in a soft mode should always be done with a rational, full-fledged diet. Under these conditions, the majority of patients who have suffered a fracture of the mandible begin to feel positive emotions, which increases their level of self-esteem and ensures greater efficiency of rehabilitation procedures (Mitin, 2018).

To stimulate sound reproduction in such patients, several special exercises promote recovery work of the lower jaw and lips. To do this, the patient should run his tongue between the corners of the

mouth, trying to reach his nose, chin with his tongue, touch his teeth with his tongue, and touch the palate with his tongue. Each movement must be performed 10 times daily. A good effect is given by exercises in articulatory gymnastics, which stimulate the vocal apparatus. They stimulate the circular muscle of the mouth, the chewing muscles, and the muscles that move the lower jaw (Epifanov, 2017).

Some patients develop dysphonia after a fracture of the mandible due to hoarseness. This requires a serious correction of diction. For this purpose, special schemes of word pronunciation are used, consisting of complex combinations of consonants and vowels. These texts should be read at least 5 times a day for half an hour (Oshurkova & Medvedev, 2018b).

It is possible to enhance the health-improving effects of exercise through the use of physiotherapy after fractures of the lower jaw. The use of several physical therapies in rehabilitation can prevent many complications of jaw trauma, reduce inflammation and restore the chewing ability of the jaw. The use of physiotherapy significantly stimulates receptors on the oral mucosa. This is very beneficial in terms of local enhancement of nervous regulation and microcirculation. In the jaw, blood circulation and lymph circulation increase, the formation of excessive granulations is inhibited, inflammation and stagnation phenomena are weakened, and local metabolism is activated. All these speed up the course of regeneration processes in the fracture zone (Bobilev, 2017).

Electrophoresis is very effective in case of a fracture of the lower jaw - a procedure during which liquid drugs are delivered to the jaw tissue due to the influence of an electric current. It is very effective in the course of rehabilitation after any injuries, especially in the face area. For fractures of the lower jaw, several options for electrophoresis are used: on the gum; on the surface of the tooth, and in the nasal cavity. Most often in Russia, this procedure is carried out using the Potok-1 device. This device has special intraoral electrodes that allow these effects to be carried out. To eliminate inflammation, electrophoresis is performed with a solution of vitamin P (1%) or with a solution of ascorbic acid (5%), or with a solution of trypsin (1%) (Retinsky, 2016).

In patients with a fracture of the lower jaw, physiotherapeutic procedures are carried out using diadynamic therapy. In the course of this effect, ions are redistributed inside the tissues, the degree of permeability of cell membranes changes physiologically favorably, blood circulation is stimulated, and anesthesia occurs. This method involves the use of 6 types of current, differing in pulse duration. For a highly effective treatment, a course of at least five days is recommended (Skoryatina & Medvedev, 2019).

Another effective method of physiotherapy for jaw injury is the method of fluctuating. It involves the application of alternating current through the extraoral and intraoral electrodes. Three current forms are used: bipolar symmetrical, partially rectified, and continuously pulsed current. The first two forms help relieve pain and inflammation. The third form helps to inject liquid drugs into the tissues. In the case of jaw injury, fluctuation is often combined

with exposure to ultrahigh frequency current (Vorobyeva & Medvedev, 2018).

For the rehabilitation of patients with a fracture of the mandible in Russia, the alternating current generated by the Iskra-1 or Iskra-2 Darsonval apparatus is often used. They are capable of generating a variable high-frequency current of low strength, but a sufficiently high voltage. During this treatment, the sensitivity of tissue receptors is weakened, which leads to a pronounced analgesic effect. In addition, under the influence of this current, itching in the tissues weakens, vasospasms are eliminated, and the movement of leukocytes is stimulated. Darsonvalization improves microcirculation. It is especially effective when used in combination with ultraviolet radiation (Pudov, 2016).

Exposure to the ultra-high frequency in patients with fractures of the mandible is carried out in Russia using ultra-high-frequency electrotherapy devices-4 and ultra-high-frequency-66. In response to these effects, changes in the conformation of molecules in biological fluids occur. Under conditions of exposure to ultra-high-frequency electromagnetic fields, it increases the function of macrophages, weakens edema, stimulates metabolism, increases the growth of young connective tissue.

The use of magnetic force fields for fractures of the lower jaw provides a decrease in edema, weakening of hyperemia, increased release of exudate from the injured area. The use of a magnetic toothbrush provides an effective magnetic massage of the entire periodontium. To conduct magnetic therapy in such patients in Russia, as a rule, the devices "Pole-1" and "Zvezda-3" are used (Komelyagin, 2015).

Hydrotherapy in patients who have suffered a fracture of the mandible consists of irrigating the oral cavity warm solutions of various drugs (decoctions of herbal herbs, seawater, mineral water, hydrogen peroxide, furacilin solution). They are necessarily warmed up a little and, using a spray in the form of an aerosol, are applied to the walls of the oral cavity (Karpov, 2018).

Using special vibrating massagers and vibrating nozzles, gums are massaged in patients with a fracture of the lower jaw. It stimulates blood circulation in tissues, metabolism, and regeneration processes. To carry out such a massage, many attachments have been created that are capable of vibrating in different modes. Massaging effects on the gums increase the lymph flow in the jaw, which accelerates the resorption of the inflammation focus, and relieves tissue edema (Vorobyeva & Medvedev, 2019).

In case of injury to the lower jaw, mud therapy is often used. The healing effect of therapeutic mud is possible due to its chemical properties. To carry out mud applications on the surface of the lower jaw, sulfide mud and peat are used. The positive effect of mud applications is carried out as a result of their stimulating effect on the skin receptors. This normalizes tissue pH, stimulates lymph outflow in them, and activates blood circulation (Nikitin *et al.*, 2017).

The use of paraffin therapy and ozokeritotherapy, which are options for thermal treatment, helps with injuries of the lower jaw. The application of these agents to the fracture zone causes strong resorption, anti-inflammatory, and weak antiseptic effect (Nasyrova & Bogovskaya, 2016).

Local temperature treatment can be carried out at the site of the mandible fracture. For this, contrast temperatures are used to stimulate blood microcirculation in tissues and normalize vascular tone. The onset of hyperemia during the warming up of the periodontium lasts up to 10 hours. This normalizes the functions of blood vessels and receptors in them. As a result of thermal procedures, the absorption of medications is activated, which increases their effectiveness in the area of application (Afanasyev *et al.*, 2017; Tkacheva & Medvedev, 2020).

An essential role in the process of rehabilitation of patients after a fracture of the mandible is played by the competent application of psychological influence. The connection between the restoration of neuropsychological balance and the speed of tissue regeneration in patients was noted. Effective psychotherapy is designed to correct the patient's unwanted behavioral reactions and form his desire to actively participate in the course of his rehabilitation and resist all painful disorders in the body (Malikova, 2016).

## Conclusion

Among today's youth, there is a high incidence of maxillofacial fractures. As a result of this injury, the function of the jaws is often significantly impaired and a persistent and pronounced "cosmetic defect" is formed. Many options for the rehabilitation of such patients have already been developed, but none of them is ideal. Physical culture is of fundamental importance in this process. Only with its help, especially in combination with physiotherapy and psychotherapy, it is possible to achieve significant recovery in such patients. The use of such a health complex can almost always provide a lasting positive effect. The continuing need to accelerate and increase the efficiency of the rehabilitation process after a fracture of the mandible requires further extensive research in this direction.

**Acknowledgments:** The team of authors thanks the administration of the Russian State Social University for the opportunity to research its basis.

**Conflict of interest:** None

**Financial support:** The study was conducted at the expense of the authors.

**Ethics statement:** The study was approved by the local ethics committee of the Russian State Social University on September 15, 2018 (protocol №11).

## References

Abdrashitova, A. B., & Saleev, R. A. (2018). Analysis of

temporary disability of patients with diseases of the maxillofacial region. *Youth in Science: New Arguments*, 130-132.

- Afanasyev, E. V., Galkin, A. N., & Kostrigina E. D. (2017). Physiotherapeutic methods of treatment used for injuries of the maxillofacial region, their importance in the period of rehabilitation of patients with injuries of the face and jaws. *Integration Processes of World Scientific and Technological Development*, 58-61.
- Almazroea, A. H., Almugheerbi, S. I., Alamri, M. A., Alloqmani, M. M., Almohammadi, G. A. S., Bazarbay, A. A., & Khoshhal, B. A. (2019). Prevalence of antibiotic use for pediatric acute viral gastroenteritis in Medinah medicine Almunwarah, KSA. *Pharmacophore*, 10(6), 37-49.
- Amelina, I. V., & Medvedev, I. N. (2009). Transcriptional activity of chromosome nucleolar organizing regions in population of Kursk region. *Bulletin of Experimental Biology and Medicine*, 147(6), 730-732.
- Bespalov, D. V., Medvedev, I. N., Mal, G. S., & Makurina, O. N. (2018b). Functional activity of the vascular endothelium in patients with initial signs of atherosclerosis against the background of regularly dose-related exercise stress. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(2), 1020-1024.
- Bespalov, D. V., Medvedev, I. N., Mal, G. S., & Polyakova, O. V. (2018a). Physiological capabilities of the vascular endothelium with the developing arterial hypertension in people of different ages who had long had low physical activity. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(2), 972-976.
- Bobylev, N. G. (2017). Unique technologies of Osteosynthesis for fractures of the bones of the face, developed by the department of dentistry, surgical, and maxillofacial surgery. *Far Eastern Medical Journal*, 2, 17-20.
- Dzhambaeva, N. I. (2016). Modern view of the problem of maxillofacial trauma. *International Journal of Applied and Basic Research*, 5(5), 742-745.
- Epifanov, S. A. (2017). Evolution of technologies in maxillofacial surgery and dentistry of the Pirogov center. *Bulletin of the National Medical and Surgical Center. N.I. Pirogov*, 12(4-1), 354-361.
- Glagoleva, T. I., & Medvedev, I. N. (2020). Physiological features of aggregation of the main formed elements of blood in calves at the beginning of early ontogenesis. *BIO Web of Conferences*, 17, 00161. doi:10.1051/bioconf/20201700161
- Glamazdin, I. G., Medvedev, I. N., Sysoeva, N. Y., Goryacheva, M. M., Kryukovskaya, G. M., & Maryushina, T. O. (2021). The severity of changes in the levels of formed elements in the blood of pigs with different types of higher activity in the conditions of their use of Eleovite. *Bioscience Biotechnology Research Communications*, 14(1), 161-171.
- Isaikin, A. I., & Smirnova, D. S. (2017). Temporomandibular joint dysfunction. *Russian Medical Journal*, 25(24), 1750-1755.
- Karpov, S. M. (2018). Clinical and neurological consequences in the long-term period of maxillofacial trauma. *Russian Journal of Pain*, 56(2), 37-38.
- Karpov, V. Yu., Medvedev, I. N., Dorontsev, A. V., Svetlichkina, A. A., & Boldov, A. S. (2020). The state of cardiac activity in Greco-Roman wrestlers on the background of different

- options for weight loss. *Bioscience Biotechnology Research Communications*, 13(4), 1842-1846.
- Karpov, V. Yu., Pilosyan, N. A., Stepanova, O. N., & Bakulina, E. D. (2018). Physical rehabilitation of preschoolers with cerebral paralysis by means of hippotherapy. International Conference on Research Paradigms Transformation in Social Sciences. Tomsk Polytechn Univ, Tomsk, RUSSIA. *European Proceedings of Social and Behavioural Sciences*, 35, 529-535.
- Komelyagin, D. Yu. (2015). Features of the treatment of children with fractures of the bones of the maxillofacial region after animal bites. *Dentistry of the Slavic States*, 133-136.
- Kugushev, A. Yu., & Lopatin, A. V. (2017). Modern approaches to the diagnosis and treatment of fibrous dysplasia of the craniofacial region. *Pediatric Surgery*, 21(2), 93-98.
- Makhov, A. S., & Medvedev, I. N. (2018a). Functional mechanisms to ensure the reactivity of the organism. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 924-929.
- Mal, G. S., Kharitonov, E. L., Vorobyeva, N. V., Makhova, A. V., & Medvedev, I. N. (2018a). Functional aspects of body resistance. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 60-65.
- Mal, G. S., Medvedev, I. N., & Makurina, O. N. (2020). The prevalence of extreme severity of autoaggression among residents of Russia. *Bioscience Biotechnology Research Communications*, 13(4), 2125-2129.
- Mal, G. S., Vorobyeva, N. V., Makhova, A. V., Medvedev, I. N., & Fayzullina, I. I. (2018b). Features of physical rehabilitation after myocardial infarction. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 280-285.
- Malikova, K. A. (2016). Topical issues of early diagnosis of craniocerebral trauma in patients with traumatic injuries of the maxillofacial region. *International Student Scientific Bulletin*, 4(1), 118-119.
- Medvedev, I. N. (2018a). Functional features of intravascular platelet activity in adolescents with high normal blood pressure, overweight or a combination of them against the background of regular physical exertion. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 1258-1265.
- Medvedev, I. N. (2018b). Physiological response of intravascular platelet activity in boys with high normal blood pressure to regular physical exercise. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 1244-1250.
- Medvedev, I. N. (2018c). The physiological properties of platelets in people 18-35 years old, trained in the section of general physical training. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 1277-1283.
- Medvedev, I. N. (2018d). Dynamics of functional parameters of platelet hemostasis in young people with hemodynamic and metabolic disorders on the background of regular physical activity. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 1217-1222.
- Mitin, N. E. (2018). Variants of temporary immobilization in case of jaw fractures. *Russian Medical and Biological Bulletin Named after Academician I.P. Pavlova*, 26(4), 559-566.
- Nasyrova, A. N., & Bogovskaya, E. A. (2016). Medical rehabilitation of patients with traumatic injuries of the maxillofacial region. *Questions of Balneology, Physiotherapy and Physical Therapy*, 93(2-2), 112-113.
- Nikitin, A. A., Sipkin, A. M., & Akhtyamov, D. V. (2017). Organizational and methodological approaches to providing care to patients with maxillofacial injuries, practiced in the Moscow region. *Medical technology. Evaluation and Selection*, 3(29), 204-205.
- Oshurkova, Ju. L., & Medvedev, I. N. (2018a). Functional features of platelets in newborn calves Ayrshire breed. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 313-318.
- Oshurkova, Ju. L., & Medvedev, I. N. (2018b). Physiological indicators of platelets in Ayrshire calves during the dairy feeding phase. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 171-176.
- Pudov, A. N. (2016). Prevalence and clinical significance of chronic alcohol intoxication in acute trauma of the mandible. Bulletin of new medical technologies. *Electronic Edition*, 10(3), 78-79.
- Retinsky, B. V. (2016). The use of protective tires and sports mouth guards for the prevention of injuries to the maxillofacial region. *Advances in Modern Science*, 1(8), 139-142.
- Skoryatina, I. A., & Medvedev, I. N. (2019). Correction of aggregation level of basic regular blood elements in patients with hypertension and dyslipidemia receiving rosuvastatin and non-medicinal treatment. *Bali Medical Journal*, 8(1), 194-200.
- Suhluli, R. J., Mashhour, K. M., Albushi, A. A., Albalawi, S. L., Alahmari, A. M. A., Aljuhani, A. R. A., Alturaifi, M. R., Hilabi, M. A., Aldoghmi, A. K. B. & Alanazi, Y. M. (2019). Otitis media diagnosis and management in family medicine practice: literature review. *Archives of Pharmacy Practice*, 10(3), 21-25.
- Tkacheva, E. S., & Medvedev, I. N. (2020). The severity of the disaggregation function of blood vessels in piglets of plant nutrition. *Bioscience Biotechnology Research Communications*, 13(3), 1174-1178.
- Uklonskaya, D. V., & Agaeva, V. E. (2017). Swallowing normalization as a way to optimize speech therapy for maxillofacial defects. *Problems of Modern Teacher Education*, 55(10), 190-196.
- Vorobyeva, N. V., & Medvedev, I. N. (2018). Physiological features of platelet functioning in calves of Holstein breed during the newborn. *Research Journal of Pharmaceutical, Biological, and Chemical Sciences*, 9(6), 129-135.
- Vorobyeva, N. V., & Medvedev, I. N. (2019). Functional activity of platelets in newborn calves of black-marked breed. *Bulgarian Journal of Agricultural Science*, 25(3), 570-574.