

*Full Length Research Paper*

# The effect of mummy on the healing of bone fractures

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Femoral and tibia fractures are considered the most common fractures in long bone fractures. Mummy is traditionally used to treat fractures. This study was performed to evaluate the effect of mummy on tibia and femoral bone healing in patients referred to Kashani Hospital in Shahrekord, Iran. In this non-interventional cohort study, the population consists of patients that were referred to Kashani Hospital in Shahrekord, Iran, and the sample size was 138 patients which were randomly selected from the study population. At the start of the study, the patient's history and demographic data were taken, radiography film was prepared and their pain was measured using visual analogue scale (VAS). Patients received appropriate treatment, which was followed by taking of their radiography film on weekly bases (weeks 1, 4, 8 and 12 post treatment). After data collection, data were detected in two groups: case group (the patients that used mummies) and observed group (the patients that did not use mummies). The collected data were analyzed using statistical software. According to patients' radiographies, improvement rate in the case group was better than that in the observed group (control), and this difference was statistically significant in weeks 8, 12 and 20 of post treatments ( $P < 0.05$ ). The pain level was less in the case group as compared to the control group in the first week of post treatment ( $P < 0.05$ ). Mean age for patients in the case and control groups was  $58.73 \pm 8.50$  and  $56.07 \pm 8.14$  ( $P > 0.05$ ), respectively. Based on the results of this investigation, mummy is a traditional drug used from ancient times to improve fracture healing.

**Key words:** Mummy, tibia, femoral, bone fracture, healing.

## INTRODUCTION

Millions of fractures occur each year in the world, 6.2 million of which have been reported in America annually. Although, numerous treatments were performed, about 5 to 10% of these fractures are still faced with problems (Claes and Willie, 2007). Fracture healing is a complex biological process that leads to the reconstructing of damaged skeletal tissue. For bone structure and function to return to its normal situation (Elmstahl et al., 1998), regulatory mechanisms are used nowadays to decrease calcium rate in broken area during fracture healing, while some unknown chemical factors are used to stimulate bone healing during fracture (Tucker, 2003). On the other hand, studies have shown that the time rate needed for a bone fracture to heal may reduce by a decrease in bone calcium. The reduction of bone calcium may be due to

zinc shortage. Femoral and tibia fractures were considered the most common fractures in long bone fractures (Yacoubian et al., 2002; Holmes, 2004). These lesions require heavy treatment costs and expose a considerable pressure on health system in Iran (Yacoubian et al., 2002; Nazem et al., 2008). The high prevalence of these fractures shows the importance of proper treatment with appropriate therapeutic methods to accelerate recovery and to reduce complications in these lesions (Friedman, 1999; Boden and Feagin, 1997).

One of the proposed methods for the treatment of tibia fractures is the use of external fixator. Malgaigne (1843) described it with patellar fracture for first times. This was under the conditions that cast technique was introduced 12 years later (Possley et al., 2010). Lambotte posed the external fixation in 1902 (Lambotte, 1912). Currently, various treatment methods, such as casting, plating, intramedullary nail fixation and external fixation have been introduced. If proper treatment is not performed on these fractures, the treatment failure may cause multiple

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complications, patients are imposed (double pressures) to stay at home, at all times. Alternative and complementary medicines were considered the sole treatment in many years, their ingredients were used in pharmaceutical industry in some cases (Crooke, 1926). Today, the tendency of using medicinal plants is increasing; because of low adverse effects, medicinal plants play an important role in traditional medicine and are wildly consumed as home made remedies. In the past decade, there has been a significant increase in the use of herbal medicine due to the minimal side effects, availability and acceptability to majority of the population of under developing countries (Collee et al., 2004). A variety of effective compounds in plants and cultivation dependent industries are introduced, the World Health Organization suggested the use of medicinal plants (Amin, 1992). Mineral and animal products were used to treat wounds in ancient Egypt (Adami, 1991).

Mummy or mountain sweat is locally called Mumnaye; it is secreted like pitch that is found in some gaps and cracks of caves and fractures on the earth's surface. Mummy is a brown or black, nearly solid material which resulted from oxidizing oil in cracks and fractures in layers of the Earth's surface. It is melted at 100°C and its specific gravity is 1.2 g. Its combinations are hydrocarbon, oxygen, nitrogen and sulfur. The best kinds of mummy used in old medicine are black and shiny. They are used as a solution in oil or plaster prescribed for fractures, dislocated joints and bruising in the ruptured part of nerves and muscles (Dehkhoda, 1956). Mummy is divided into two types: fat-soluble organic materials; such as alcohol and chloroform, and water-soluble organic materials. The first type is pitch like and the second type is different from the first. Its chemical analysis is included in calcium ions, phosphate, carbonate, magnesium, nitrogen and in polysaccharide as well (Adami, 1991). Mummy is used in two forms: topical and oral intake, in order to use a topical treatment for wounds and inflamed joints, mummy is solved in boiling water and is rubbed down on the desired part. The temperature fits between 115 and 118°C in 30 min with a load of 0.7 atmosphere (Adami, 1991). Bu-Ali Sana mentioned its beneficial effects in his Canon (Law) book in: healing fracture and dislocation of joints, relieving headaches, earwax stop, throat pain, cough, palpitation, heart collide, hiccup, poisoning, scorpion bites and strengthening the stomach (Collee et al., 2004). Tavakoli et al. (2003) in a study entitled "A comparison of the effectiveness of phenytoin cream on wound healing in rat skin and the consuming of topical mummy" state that mummy probably reduces swelling or inflammation, that is, the decrease of an inflammation (wound) improves healing (Byl et al., 1992; Dehkhoda, 1956). Due to the increase of oxygen in wound, mummy heals faster (Tavakoli et al., 2003). Razvani-Pour confirmed in his study, the beneficial effect of mummy in fracture healing of tibia bone of mice (Rezvani-Pour and Khatibi, 2007). In another study, it

was shown that, the percentage of wound healed by mummy when comparable to phenytoin and its solution had a completely preventive effect on the growth of atropine pseudomonas (Tavakoli et al., 2003).

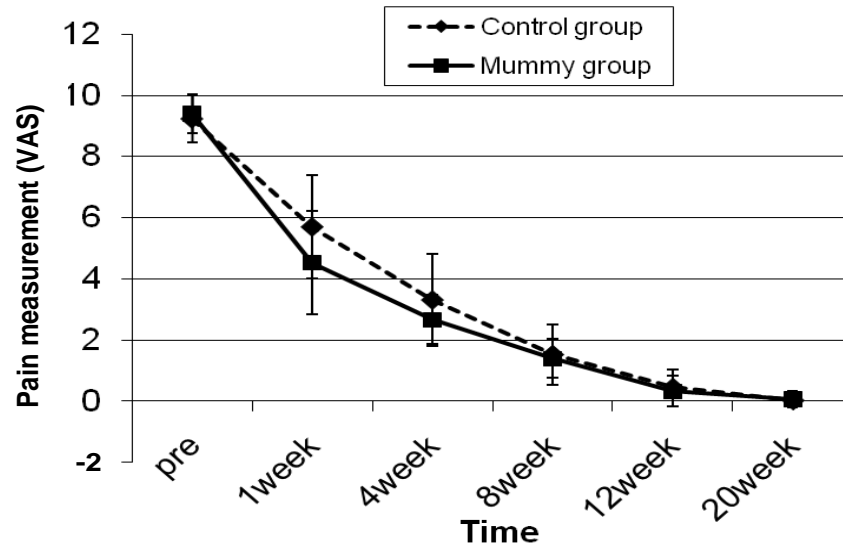
The pharmacopoeias of the fifteenth and sixteenth centuries give the primary preparations of mummy; involve making into a tincture, an elixir, treacle and a balsam. To make mummy balsam: take half a pound of mummy tincture, add four ounces of Venice treacle, four drachms of pearl salt, two drachms of coral, two ounces of terra sigillata and one drachm of musk; mix and take a spoon full; the result is "piercing qualities that pierce all parts, restore wasted limbs, healticks and cures all ulcers and corruptions." Pure mummy was given as a powder or as a bolus, a dose of two drachm, in the treatment of vertigo, palsy and epilepsy; it could also be applied externally to wounds and also prevent mortification.

In Asian tradition, mumia or mummy is also a medicine, but of a different sort, here, is its derivation: the English word mummy springs from the Persian and Turkish moum; literally meaning a soft clammy substance of the consistency of balsam. A related word is the Persian-Urdu mom 'bee's-wax', from these roots come the Arabic mum 'wax', mumiya 'an embalmed body' and the English mummy 'preserved human body'.

In ancient time, bitumen was a well known medicine used all over the Near East, there are several kinds of bitumen that naturally occurs, they are easy to get and use. 'A soft clammy substance of the consistency of balsam' is a fair description of some. Balsam is a term used for various pleasantly scented plant products, there are oily and gummy oleoresins, usually containing benzoic acid or cinnamic acid, obtained from exudates of various trees and shrubs, and used as a base for some botanical medicines.

It was mentioned in Thomas Herbert's "Travels in Persia, circa 1627", thus: "About twenty farsangs (sixty British miles) west of Lar, was a town called Jaarown (or Jahrum); this was between Persepolis and Shiraz, and in or near this place is a precious liquor or mummy growing, they called it Mumnaky-koobas, which none presumes to take, it being carefully preserved for the King's sole use. In June, only it distils from the top of those stupendous mountains, every year about five ounces was collected. A moist redolent gum it is, sovereign against poison, and if we may believe them, a catholicon for all sorts of wounds whatsoever. When other princes send Shaw-Abbas gold, pearl, or costly presents, he in return gives them a little of this balsam as a suitable requital." (Pg. 61 to 62.)

This mummy is a kind of bitumen that exudes from rock, it was named medicine catholicon, which is a term used for universal medicine. It could cure absolutely any-thing and is obviously much prized for its power to heal. For other Persian travelers, Stevens called it 'momiya kani', 'mineral momia' or 'mummy', while Kaempfer called it muminahi kodreti (qudrati, 'God-given'), and Teixeira added the term 'momnahy'.



**Graph 1.** The amount of decreasing pain in two groups of patients in different times

Crook (1926) a nineteenth century expert on Indian folklore mentions the balsam of Lar, as a natural balsam or bitumen, he wrote: "distilled through the rock of a cavern in the province of Lar, its a medicine so precious that the Shah (king) kept it all for his own use. The governor of Lar under his orders sealed the door of the cave three hundred and sixty four days of the year, opening them just once yearly to harvest the balm; its yearly yield was scarcely two ounces, and cured all sorts of illnesses, especially fractures". Some articles mentioned in this context are not in relation with the subject about mummy. Therefore, a scientific study has not been conducted yet on this material used to heal fractures traditionally. Mummy causes moderate inflammation and increase oxygen to the damaged body (Rezvani-Pour and Khatibi, 2007). The aim of this study was to evaluate the effectiveness of mummy, on tibia and femoral bone fracture patients who were referred to specialists in Shahrekord Kashani Hospital.

## METHODOLOGY

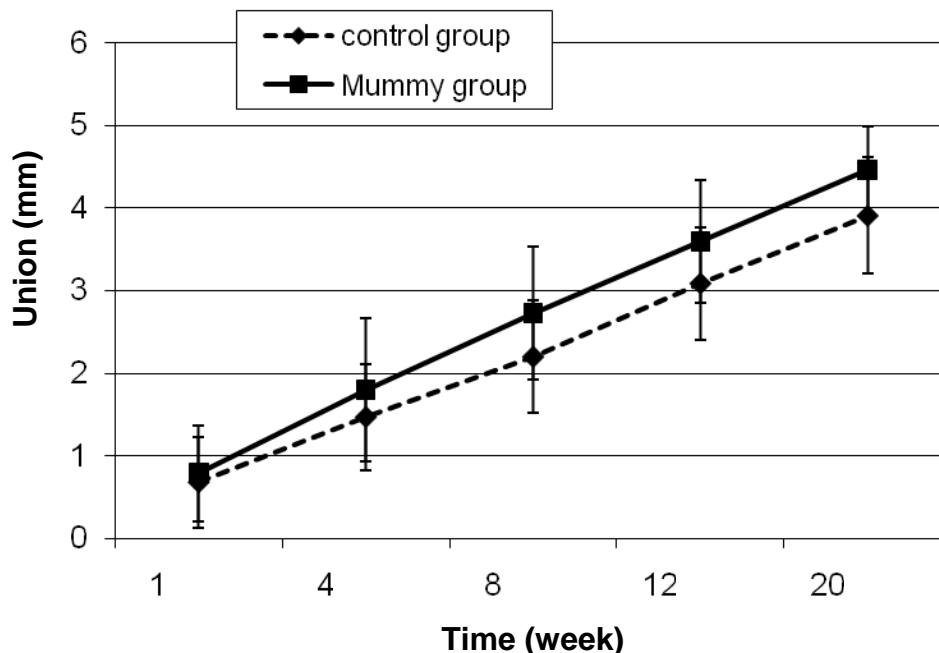
This research was conducted with patients from Chaharmahal and Bakhtiari provinces who were referred to an Orthopedic Clinic in Shahrekord Kashani Hospital during the first six months of 2009. This research project received the confirmation of the Ethics Committee of Shahrekord University of Medical Science, with the number of 87-10-2. 138 patients with fracture of the femoral and tibia bone were entered in a non interventional study; patients' references were accompanied with the record of their demographic features. On the entrance, the patients' pain was assessed based on visual analogue scale (VAS), information relating to the measurement (extent) of the fracture, based on the first radiograph result with their consent to participate in this project were recorded. All the measurement situations were detected identically. Patients took part in X-ray examination at intervals of 1st, 4, 8, 12, and 20th week. The rates of patients' improvement were recorded in a

questionnaire. Patients' mummy consumption rate, that is, if it was consumed or not, was recorded in the questionnaire. The scale of consumption was determined based on the times of consumption in a week. The amount of consumption was scaled based on a custom scale (one pea or 5 g) in different times. Moreover, information on whether or not they used any drug other than mummy was collected. It should be mentioned that patients with fractures in the other parts of their body or those with disease addiction were excluded. Finally, information was collected from patients that used mummy (case group) and those that consumed other drugs (control group). Using independent t-test, statistical chi-square test and variance analyses, matching of these groups was performed statically putting all aspects into consideration.

## RESULTS

This research was performed on 138 patients. Ninety eight patients (71%) were male and 40 patients (29%) were female. The range of patients' age was 35 to 71 years. The mean age of patients in the case group (mummy group) was 56.64 years with a standard deviation of 8.13, and the mean age of patients in the control group was 56.07 years with a standard deviation of 8.14 ( $P > 0.05$ ).

The mean pain was 9.4 with a standard deviation of 0.63 in case group (mummy group), and 9.24 with a standard deviation of 0.77 in control group. Using independent t-test, it was revealed that there were no significant differences between the mean of both groups in the first referring ( $P > 0.05$ ). Using this test, the mean pain in both groups was significant in the first week ( $P < 0.05$ ). Over time, the mean pain declined in both groups, using repeated measurement of pain based on VAS scale, the pain rate were significant in both groups in different weeks ( $P < 0.05$ ) (Graph 1). The decrease in pain was significant using repeated measurement test in



**Graph 2.** The amount of union in two groups of patients in different times.

both groups ( $P < 0.001$ ).

The mean pain decrease was significant using repeated measurement test between two groups ( $P < 0.002$ ).

The union rate of fractured bone was examined at different times and recorded in patient questionnaire based on the radiology taken. According to these dates obtained, fracture distance in case group was less than that of control group. On the other hand, the rate of union in experimental group was more in control group. However, the mean rate of union in the fracture part increases in passing time. Using repeated measurement, the union rate was significant in both groups ( $P < 0.001$ ). Using this test, interaction effects between 5 weeks factors and groups was significant ( $P < 0.007$ ) (Graph 2).

## DISCUSSION

The results of this study revealed that mummy could be a suitable drug for bone fracture healing and reducing its complications. Mummy was effective on healing of tibia and femoral bone fracture in patients referred to Orthopedics Clinic of Kashani Hospital in Shahrekord. In this study, the referred patients pain were measured during the first, fourth, eighth, twelfth and twentieth week by VAS scale. Using independent t-test, the mean pain between two groups was not significant in the first referring ( $P < 0.05$ ). Also, both groups used identical way of decreasing pain in patients. Probably, it is because of drugs consumption not being significantly different between two groups in pain.

In a study by Tavakoli et al. (2003) entitled "A comparison of the effectiveness of cream phenytoin on wound healing in rat skin and the consumption of topical mummies", they stated that mummies would probably cause reduction in swelling and inflammation. On the other hand, the decrease of wound inflammation causes wound to heal faster (Tavakoli et al., 2003). The other possible mechanism for wound healing faster by mummies may be due to increased oxygen to the wound (Rezvani-Pour and Khatibi, 2007). The healing rate of tibia and femoral fracture in mummies group was more than that of the control group. The difference between two groups during the eighth, twelfth and twentieth weeks was significant ( $P < 0.05$ ). Fracture healing is a complex biological process that leads to the reconstruction of damaged skeletal tissue, resulting to the structure and function of bone returning to its normal situation (Elmstahl et al., 1998). The mechanisms of bone fracture healing and the chemical factors that stimulate bone healing in fractures are not fully known (Crooke, 1926). It has been specified that, during the period of bone fracture healing the calcium content in the broken area decreases. On the other hand, studies have shown that the rate of bone fracture healing time and the decrease in the amount of bone calcium may slow healing period. It is also possible that the reduction in the amount of bone calcium is as a result of the zinc in the bone. The current study showed that mummies accelerate bone fracture healing. Results of this project adjust to public beliefs and ancient medicine. They believed, drinking soluble in oil or its plaster is beneficial for patients with fracture, dislocated

joints, bruise, torn nerve and muscle (Dehkhoda, 1956).

In addition to this study, another study has been carried out about the effects of bone fracture healing on animal subjects. The study of Rezvani-Pour and Khatibi (2007) on 20 rabbits with experimental fractures showed that mummy had beneficial effects on fracture healing. Adami (1991) published information on the effect of mummy on pigeon bone fracture and confirmed the positive effect.

## Conclusion

An appropriate drug for the treatment of bone fractures is not known; as such, the results of this study show that mummy can be suitably used as a complementary drug to speedily heal bone fracture and in reducing complications. Moreover, mummies are traditionally used to heal fractures.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

Although, this research was the first to be performed on the effects of mummies on human fractures, this requires further studies on the effects, its active ingredients and possible side effects, and the most appropriate way (oral or topical) to use it as well.

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