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Original article

Does Iranian *Astragalus gossypinus* honey assist in healing caesarean wounds and scars?

Tooba Heidari [a,*], Nasrin Roozbahani [a], Leila Amiri Farahani [a], Mahtab Attarha [a], Naeimeh Akbari Torkestani [a], Mehri Jamilian [a], Reza Bekhradi [b]

[a] *Arak University of Medical Sciences, Arak, Iran*
[b] *Barij Essence Pharmaceutical Company, Kashan, Iran*

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Abstract

Introduction: This study investigates the effect of Iranian *Astragalus gossypinus* honey on healing casesarean operation wounds and scars.
Methods: A prospective randomized controlled trial was conducted involving 130 women who had required a caesarean operation. They were randomized into three groups treated in honey, placebo and control groups. The REEDA scale on the 10th and Vancouver Scar Scale on the 40th post caesarean days were used to assess overall healing and scar healing, respectively.
Results: The mean healing and scar scores in honey, placebo and control groups on 10th and 40th postoperation days were not significantly different.
Conclusions: The findings do not support the use of Iranian *A. gossypinus* honey for accelerated wound healing nor does it have a prophylactic impact on scars.

Keywords: *Astragalus gossypinus* honey; Caesarean; Iran; Scar; Wound

Introduction

Caesarean section surgery as a method of birth has become common in Iran [1]. Severe anxiety results from; delay or failure in healing of the surgical wound as a common complication after caesarean section [2,3] the potential economic and emotional burden to the mother and society during a stressful postpartum period [4] and emotional detachment between mother and infant [5]. Research has shown that factors such as obesity [6], diabetes, hypertension, prolonged rupture of the foetal membrane, emergency caesarean, twin delivery [7], prolonged labour, caesarean section with long time [8], corticosteroid therapy [9], and immune suppression, anaemia, and poor homeostasis associated with haematoma formation result in increased postoperative complications. These complications include; infection, wound opening, necrotizing fasciitis, peritonitis, scar formation, can cause a longer hospital stay, and can necessitate individual interventions such as wound drainage, debridement, and repairing [4,5,10]. A scar is a mark remaining in the damaged skin following tissue improvement. Sometimes, it not only does not form a thin line but also grows in different directions and remains an anaemic area [11]. Hypertrophic scars lead to apparent and functional disfigurement and will create discomfort, physical stress, and dissatisfaction for patients [12]. Reducing oedema and exudates, producing granulation and epithelial tissue, and accelerating wound healing are known to lead to the reduction of hypertrophic scars [13].

Women who undergo caesarean section, in addition to the responsibilities of motherhood, will potentially endure pain, discomfort, and complications associated with caesarean scars that may lead to late initiation of the first breast-feeding and early weight loss in the newborns [14,15]. The existence of complications, lack of sufficient efficacy, and high cost of chemical treatments have given rise to the tendency for using traditional methods of healing and preventing scars.

Honey is a material of high nutritional value; it contains 20 kinds of sugar, eight types of vitamins, 11 types of minerals, 16 types of amino acids, and several enzymes [16], has antibacterial,

* Corresponding author. Tel.: +98 8614173503x5.
E-mail address: heidari@arakmu.ac.ir (T. Heidari).

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anti-inflammatory, and angiogenic properties, and is shown to generate granulation tissue, facilitate epithelialization, prevent and reduce scars, and alleviate pain. These properties are due to its high osmolarity, and production of hydrogen peroxide and phytochemical substances in plants nectar [13,17,18]. In modern and traditional medicine, honey has been suggested as an effective factor in improving a variety of infectious wounds [19].

In the only randomized-controlled trial carried out using honey on wound infections after caesarean section and hysterectomy, healing bacterial infections, reduced antibiotics usage, reduced hospital stay, wound healing, and decreased scar formation have been reported [20]. Noting the existence of some research, but of not high quality, in this field [13,18–20], comparative studies utilizing different kinds of honey from different plant sources for choosing the greatest efficacy [21] and determining its impact on non-surgical wound infections appears necessary.

Clinical research on the effect of honey on wounds is also very limited in Iran; there are no pharmacological products from this natural product, and more importantly no reference has been made to the plant source of honey in such studies [22–24]. Review of laboratory studies conducted on different types of honey in Iran shows *Astragalus gossypinus* honey in terms of antibacterial effects is preferred to honey with other plant sources [25]. Considering the high rate of caesarean section in Iran and the problems associated with its scar, we decided to carry out a study on the effectiveness of honey produced from the *A. gossypinus* plant on prevention of scar development, reduction of pain, complications and satisfaction of women with caesarean scars free of complications and the effects of Caesarean wound healing time and the degree of scaring.

Methods

A cohort of women were identified who had undergone caesarean section with transverse lower uterine incision and Pfannenstiel incision on the skin by the same gynaecologist referring to Ayatollah Taleghani Hospital in Arak. In order to carry out a randomized-controlled clinical trial the honey and placebo groups, it was considered that at significance level 0.05 and a power of 0.90, a sample size of 40 in each group was necessary to detect a 20% difference in overall healing and scar healing between the honey and placebo groups [20]. Data collection was carried out following the approval of a proposal at Arak University of Medical Sciences Research Council (code: 310) and obtaining the confirmation for observing code of ethics from the ethics council (87-14 -43) and registration code in IRCT (Iran Registration Clinical Trial: 138802051845N1).

Mothers were visited 24 h after caesarean section in the women's surgery ward. Subjects, 17–35 years old, with gestational age between 37 and 42 complete weeks, maximum two previous births were studied. Women were excluded from the study if: they had a previous caesarean section or lower abdominal surgery in the area of caesarean incision, obstetric complications (eclampsia, preeclampsia, placenta previa, placental abruption, multiple pregnancy, chorioamnionitis, meconium-stained fluid, and polyhydramnios), obvious abnormalities in the physical examination of the neonate, neonatal admission in intensive care unit, excessive bleeding and the need for blood transfusion, caesarean section or hysterectomy with myomectomy, smoking or drug abuse, history of known diseases disrupting wound healing, or had a mental disorders over the past month. All subjects were under the prenatal care in health centres or private offices. In all cases, the skin repair method was plastic using nylon thread No. 20. All mothers were in the hospital for one night and were administered 4 g cefazolin (antibiotic) intravenous (in four divided doses of 1 g every 6 h). They received cephalexin capsules 500 mg four times daily for 7 days, had one injection of the opioids (50 mg Pethidine intramuscular) and injection of 25 mg promethazine after being transferred from the operating room. They took 250 mg mefenamic acid capsules every 8 h after oral intake in the first 24 h.

After obtaining written consent from the mothers, they were assigned to honey, placebo, and control groups through randomized complete block design. Randomly selected block size of 3 was used. The researchers and the patients were blind to the type of honey used. In conducting this study, natural honey obtained from the Astragalus herb in Ashtian region, Iran, was used. This substance contains sucrose 1.5%, fructose to glucose ratio of 1.2%, humidity 14%, positive distasis, and before hydrolysis sugar content of 67.2%. Although the exact preparation of the placebo due to the unique nature of honey, especially its unique aroma, is not possible, an attempt was made to produce a placebo with maximum compliance with the intended honey in terms of colour and consistency in Barij Essence Pharmaceutical Company. The substances used for the placebo were FD&C Yellow No. 6, distillated water (DW), polyvinylpyrrolidone (PVP), tri ethanol amine (TEA) and Carbapol 940. The honey and placebo were coded and packaged in 22 g tubes at Barij Essence Centre. Women's pain score at the site of sutures was measured 24 h post ceaserean through the use of a visual analogue scale (VAS) of pain as a valid and reliable tool [26]. The mothers were interviewed to obtain information about their demographic features, prenatal care, and nutritional and health recommendations during pregnancy. The cervical dilatation upon admission, amount of cervical dilation during caesarean section, number of vaginal examinations, quality of foetal membranes rupture, interval time (minutes) between the rupture and delivery, uterine contractions during delivery, blood type, and Rhesus factor of the parturient were determined. Also, haemoglobin (ml/dl) levels, duration of surgery, duration of oral non-feeding period for the mother, foetal presentation during the operation, type of anaesthesia during the surgery, vital signs immediately after surgery and temperature 24 h later, consistency of uterus, uterine bleeding, bleeding from the surgical site were recorded for the mothers. Moreover, the time of the first breast-feeding, neonatal gender, birth head circumference, and Apgar score one and five minutes after caesarean section were recorded for the neonates. Groups receiving the tube (honey or placebo) were instructed to remove the operation dressing at the site of surgery; clean