Effects of date fruit consumption on labour and vaginal delivery in Tabuk, KSA

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Abstract

Objectives: The date fruit has been shown to possess several health benefits. This study aims to determine the effects of date fruit consumption on the onset and progression of labour.

Methods: A randomised controlled clinical study was conducted on 89 participants to assess the effects of date fruit consumption on the onset and progression of labour. Twenty-six participants consumed date fruits alone, and 32 consumed date fruits followed by drinking of water. Twenty-one participants served as controls.

Results: There was a significant positive impact of consuming (rutab) date fruits on maternal outcomes in both the first and third stages of labour (\(p < 0.05\) and \(p < 0.001\), respectively). In addition, there was a significant relationship with the foetal well-being factors, such as healthy liquor, foetal heart rate, presence of caput, and \(A\)ppearance, \(P\)ulse, \(G\)rimace, \(A\)ctivity, and \(R\)espiration (APGAR) score at 5 min (\(p < 0.05\)). The other maternal and foetal well-being factors showed no significant relationship with consumption of date fruits during labour.

Conclusion: The present study showed a promising effect of (rutab) date fruit consumption on the duration of the stages of labour. No significant differences were observed between the date fruit consumers and their counterparts regarding cervical dilatation; rupture of membranes; strength, frequency, and regularity of uterine contractions; tocometric reports; and maternal progression factors. Additionally, the APGAR score at 5 min was better among the infants whose mothers consumed date fruits.

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Peer review under responsibility of Taibah University.
Introduction

In the holy Quran, the holy book of Islam, Allah instructs the Virgin Mary, Mariam, to consume date fruits when she gives birth to prophet Isa; peace will be upon him as well as the prophet Mohammed (And shake toward you the trunk of the palm tree; it will drop upon you ripe, fresh dates). Therefore, not surprisingly, date fruits are commonly referred within the Islamic tradition as beneficial to pregnant women. We might use this as a ‘pre-scientific’ magical background to assess the effects of date fruit consumption on the onset until the final stage of labour. The date fruit (Phoenix dactylifera) appears to be a reasonable food choice for pregnant women as a part of a well-balanced diet. It contains a high percentage of carbohydrates, fat, 15 types of salts and minerals, proteins, and vitamins.

The saturated and unsaturated fatty acids, such as oleic and linoleic acids, in date fruits play an essential part in the production of prostaglandins apart from contributing and providing energy. The increase in the levels of the latter in pregnant women causes uterine contractions during term. Therefore, date fruit consumption can be helpful in saving energy and strengthening the uterine muscles. This fruit also contains hormones that help the uterus stretch and be prepared for infant delivery. Its consumption is helpful in storing energy and strengthening the uterine muscles. Thus, it prevents postpartum haemorrhage, spontaneous labour, and speeding up of the delivery progress. According to Kordi et al. and Yusuf et al., consuming date fruits in late pregnancy has a significant role in spontaneous labour. Al-Kuran et al. reported that the duration of the latent phase of the first stage of labour was shorter in the group that consumed date fruits and that the average cervical dilation at the time of admission was significantly higher than that in the group that consumed date fruits. Date fruits affect oxytocin receptors and make the uterine muscles respond better to oxytocin, resulting in much more effective uterine contractions.

In a recent non-randomised clinical trial comparing date fruit to oxytocin in controlling postpartum haemorrhage, it was found that the ingestion of date fruits significantly reduced the amount of haemorrhage compared to the administration of oxytocin in the first hour following placental delivery owing to the presence of compounds in date fruits that mimicked the action of oxytocin. Drinking of water following consumption of date fruits during labour may be more effective in the promotion of labour than administration of intravenous fluids alone. A recent study conducted in the KSA investigated the effect of eating date fruits and drinking water versus intravenous fluid administration during labour on labour and neonatal outcomes; there was a significantly shorter median duration of the second and third stages of labour in the study group than in the control group.

The consumption of date fruits in late pregnancy has favourable results in shortening labour stages, without influencing labour outcomes. In a Jordanian study, the effect of late pregnancy consumption of date fruits on labour and delivery was determined starting from late weeks of pregnancy; a comparison between the two groups showed significant outcomes in cervical dilatation on admission, status of the amniotic membranes, type of onset of labour, and less need for prostin/oxytocin utilisation. The study had concluded that the consumption of date fruits in the last 4 weeks before labour significantly reduced the need for induction and augmentation of labour and yielded a more favourable, but non-significant, delivery outcome.

Furthermore, it was found that eating date fruits increases pain tolerance and plasma anti-oxidant capacity for 4 h. Following consumption, date fruit digestion extracts are absorbed and used by the cells shortly after consumption. The authors also found no significant differences in the duration of labour; rate of augmentation; mode of birth; Appearance, Pulse, Grimace, Activity, and Respiration (APGAR) score; and umbilical artery and vein pH, although a sufficient statistical power was not obtained to draw reliable conclusions on the effect of drinking on labour outcomes.

Materials and Methods

Study design

This study was an interventional hospital-based randomised controlled trial (RCT) conducted in King Fahd Specialty Civil Hospital, Tabuk, KSA on pregnant women who were admitted for normal vaginal delivery, during the season of rutab in 2017. The study was conducted from August 2017 to December 2017. Rotana rutab date fruits were used. After study explanation and obtaining consent, the women enrolled in the study were requested to join one of three groups in an open-label manner, with an instruction against cross movement.

Sample characteristics

Eighty-nine women were enrolled in the study, of which 32 (35.96%) consumed date fruits followed by drinking of 250 mL of water; 26 (29.21%) consumed date fruits alone; and 31 (34.83%) did not consume any date fruits (served as controls). Participants with high-risk pregnancy, contracted pelvis, pre-eclampsia, and uterine atony were excluded. Specific parameters were measured on arrival of the participants to the labour suite: uterine contraction frequency and strength and cervical dilatation upon admission (cm); the intactness of the amniotic membranes was also assessed. Labour progression was assessed using a partogram. A nurse and an obstetrician specialist carefully filled up the

Keywords: Date fruit; Delivery; Labour outcomes; Labour progression; Rutab
partogram and were trained on how to fill up the question-naire before starting the study.

**Materials**

Fresh date fruits (Rotana rutab) and drinking water were purchased from the local vegetable and fruit market at Tabuk, KSA. Seven pieces of fresh Rotana rutab date fruits were prepared in a disposable plate. The first group was given seven pieces of the fresh Rotana rutab type, followed by 250 mL of drinking water. The second group was given seven pieces of the fresh Rotana rutab type without water. The third group was not given any date fruits nor drinking water and therefore considered as controls. The date fruits were prepared by trained nurses.

The date fruits were immediately given after inclusion of the women in the study group; seven pieces of the fruit were repeatedly given in case of immediate vomiting following the ingestion of the date fruit in either group.

**Setting and sampling technique**

This study was conducted at the labour room of the Department of Obstetrics and Gynaecology in King Fahd Specialty Civil Hospital, Tabuk, KSA. The hospital capacity is 500 beds, with a number of admissions to the labour room ranging from 9 to 25 admissions per day for two shifts a day. The simple random sampling technique was used to select the participants in the study.

**Outcome assessment**

The primary outcome of this study was the effect of date fruit consumption on labour progression.

**Inclusion and exclusion criteria**

Any pregnant women admitted to King Fahd Specialty Civil Hospital in Tabuk, KSA for vaginal delivery (onset of labour after assessment by the team) who agreed to participate in the study were included. Patients with high-risk pregnancy, contracted pelvis, pre-eclampsia, and uterine atony were excluded.

**Data collection and analysis**

Data were collected using a structured questionnaire and analysed using the SPSS program version 20.00 (SPSS Inc., Chicago, IL, USA). ANOVA and the chi-square test were used to compare the numerical and categorical variables. A \( p \) value of <0.05 was considered statistically significant.

**Results**

There were 89 participants (primigravida: 23.86%, multipara: 69.32%, and grand multipara: 6.82%); a poor obstetric history was observed in 6.17%. Most participants (97.62%) underwent tocometric studies (56.96% continuous vs. 43.04% periodic). The tocometric findings were normal in 93.42% and suspicious in only 6.58%; no pathological features were noted. The uterine contraction strength was good in 44.26%, moderate in 44.26%, and poor in 11.8%; the uterine contractions were regular in 64.52% and irregular in 35.48%. The heart rate and blood pressure were abnormal in only a minority of the patients (1.18% each); however, the maternal temperature was almost normal in 100%, and the maternal blood sugar level was normal in 100%. Table 1 displays the other clinical characteristics of the study groups.

| Characteristics                              | Frequency (n) | Percentage (%) |
|---------------------------------------------|---------------|----------------|
| Parity                                      |               |                |
| Primigravida                                | 21            | 23.86          |
| Multipara                                   | 61            | 69.32          |
| Grand multipara                             | 6.0           | 6.82           |
| Poor obstetrical history                    | 5             | 6.17           |
| Tocometry (performed)                       | 82            | 93.42          |
| Tocometry type                              |               |                |
| Continuous                                  | 45            | 56.96          |
| Periodic                                    | 34            | 43.04          |
| Tocometric findings                         |               |                |
| Normal                                      | 71            | 93.42          |
| Suspicious                                  | 5.0           | 6.58           |
| Pathological                                | 0.0           | 0.00           |
| Uterine contraction strength                |               |                |
| Good                                        | 27            | 44.26          |
| Moderate                                    | 27            | 44.26          |
| Poor                                        | 7.0           | 11.48          |
| Uterine contraction regularity              |               |                |
| Regular                                     | 20            | 64.52          |
| Irregular                                   | 11            | 35.48          |
| Maternal temperature progression            |               |                |
| Normal                                      | 85            | 100            |
| Abnormal                                    | 1.0           | 1.18           |
| Maternal blood pressure progression         |               |                |
| Normal                                      | 84            | 98.82          |
| Abnormal                                    | 1.0           | 1.18           |
| Maternal heart rate progression             |               |                |
| Normal                                      | 84            | 98.82          |
| Abnormal                                    | 1.0           | 1.18           |
| Maternal blood sugar level progression      |               |                |
| Normal                                      | 85            | 100            |
| Abnormal                                    | 0.0           | 0.00           |
| Postpartum haemorrhage                      | 8.0           | 9.52           |
| Labour onset time/shift                     |               |                |
| Shift 1 (morning)                           | 53            | 60.23          |
| Shift 2 (evening)                           | 35            | 39.77          |
| Fluids used during labour                  |               |                |
| Ringer’s lactate                            | 31            | 51.67          |
| Dextrose 5%                                 | 18            | 30.0           |
| Dextrose 10%                                | 2             | 3.33           |
| Normal saline                               | 3             | 5.0            |
| Dextrose 5% in normal saline                | 1             | 1.67           |
| Not given                                   | 5             | 8.33           |
| Labour pain intensity                       |               |                |
| Mild                                        | 16            | 21.05          |
| Moderate                                    | 42            | 55.26          |
| Severe                                      | 18            | 23.68          |
| Physical exercises at the latest gestational weeks |         |                |
| Performed                                   | 4             | 6.35           |
| Not performed                               | 59            | 93.65          |
The cervical dilatation at baseline was 4.04 ± 1.94 cm (median ± IQR: 4.0 ± 1.75) among the patients who consumed date fruits only, 4.23 ± 1.60 cm (median ± IQR: 4.0 ± 2) among the patients who consumed date fruits followed by water, and 3.97 ± 2.43 cm (median ± IQR: 4.0 ± 3) among the controls. Table 2 illustrates the cervical dilatation progression among the participants.

The duration of the first stage of labour was 210.14 ± 177.13, 224.43 ± 157.25, and 362.46 ± 292.12 min in the patients who consumed date fruits and date fruits followed by water, and controls, respectively. The duration of the different stages of labour is also shown in Table 2.

Table 2 also illustrates the time of membrane rupture (103.20 ± 123.42 min in the patients who consumed date fruits, 168.05 ± 145.58 min in those who consumed date fruits followed by water, and 172.26 ± 169.10 min in the controls). The frequency of uterine contractions was higher among those who consumed date fruits only than among those who consumed date fruits followed by water (9.50 ± 9.79 contractions/hour vs. 4.38 ± 3.96 contractions/hour).

Spontaneous vaginal, instrumental, and caesarean deliveries were reported in 48.19%, 3.61%, and 4.82%, respectively, while normal foetal presentation was observed in 98.82%; liquor or blood-stained meconium was observed in 31.77%. The other foetal and maternal factors are shown in Table 3.

There was a significant positive impact of consuming date fruit consumption during labour. There was no difference in the duration taken for the membrane to rupture between the study groups. The placenta were delivered without any complications in both the study and control groups.

Comparative analysis (Tables 4 and 5)

Maternal factors

There was a significant positive impact of consuming date fruits on the duration of the first stage (210.14, 224.43, and 362.46 min) and third stage of labour (5.50, 5.45, and 2.17 min in the patients who consumed date fruits with water and date fruits alone and controls, respectively).

There was no significant difference between the two study groups and control group regarding cervical dilatation on admission. Moreover, date fruit consumption did not affect the labour outcomes related to cervical dilatation. Maternal progression outcome factors, such as spontaneous vaginal delivery, transfer to an obstetric unit, administration of regional analgesia, episiotomy, caesarean delivery, instrumental delivery using forceps or ventouse, and blood transfusion, were found to have no significant relationship with date fruit consumption during labour. There was no difference in the duration taken for the membrane to rupture between the study groups.

APGAR score at 1 min was lower among the patients who consumed date fruits followed by water (7.77 ± 2.02 vs. 8.59 ± 1.02); the score was 8.25 ± 1.14 in the controls. Table 2 shows the APGAR scores at 1 and 5 min.

| Factors                      | Date fruit consumers | Date fruit with water consumers | Controls |
|------------------------------|----------------------|---------------------------------|----------|
| Cervical dilatation (hour 0) | Min–max: 0–7         | 0–7                             | 0–9      |
|                             | Mean ± SD: 4.04 ± 1.94 | 4.23 ± 1.60                      | 3.97 ± 2.43 |
| Cervical dilatation (hour 1) | Min–max: 0–10        | 0–10                            | 1–10     |
|                             | Mean ± SD: 5 ± 2.47   | 5 ± 2                            | 5 ± 2    |
| Cervical dilatation (hour 2) | Min–max: 0–10        | 0–10                            | 1–10     |
|                             | Mean ± SD: 6.46 ± 2.72 | 6.76 ± 3.02                      | 6.03 ± 2.72 |
| Cervical dilatation (hour 3) | Min–max: 0–10        | 0–10                            | 2–10     |
|                             | Mean ± SD: 7.58 ± 3.17 | 7.45 ± 3.01                      | 6.97 ± 2.66 |
| Cervical dilatation (hour 4) | Min–max: 0–10        | 0–10                            | 2–10     |
|                             | Mean ± SD: 7.96 ± 3.04 | 7.90 ± 2.48                      | 7.77 ± 2.62 |

Duration of the stage of labour

First stage

Min–max: 10–660 | 30–650 | 30–1320 |
Mean ± SD: 210.14 ± 177.13 | 224.43 ± 157.25 | 362.46 ± 292.12 |
Median ± IQR: 170 ± 310 | 180 ± 216.25 | 262.50 ± 333.75 |

Second stage

Min–max: 1–20 | 1–10 | 1–7 |
Mean ± SD: 5.45 ± 4.50 | 5.50 ± 3.10 | 2.17 ± 1.50 |
Median ± IQR: 4 ± 6 | 5 ± 8 | 2 ± 2 |

Third stage

Min–max: 2–33 | 0.50–12.0 | 0.00 |
Mean ± SD: 9.50 ± 9.79 | 4.38 ± 3.96 | 0.00 |
Median ± IQR: 6.0 ± 9.0 | 2.50 ± 6.50 | 0.00 |

Membrane rupture

Min–max: 0–370 | 0–590 | 0–660 |
Mean ± SD: 103.20 ± 123.42 | 186.05 ± 145.58 | 172.26 ± 169.10 |
Median ± IQR: 50 ± 110 | 142.50 ± 215.0 | 120.0 ± 141.0 |

Estimated blood loss amount (ml)

Min–max: 100–600 | 75–600 | 100–600 |
Mean ± SD: 302.27 ± 126.75 | 297.20 ± 153.78 | 287.50 ± 157.2 |
Median ± IQR: 300 ± 212.50 | 300 ± 200 | 212.50 ± 237.5 |

APGAR score at 1 min

Min–Max: 1–5 | 5–10 | 4–9 |
Mean ± SD: 7.77 ± 2.02 | 8.59 ± 1.02 | 8.25 ± 1.14 |
Median ± IQR: 9 ± 3 | 9 ± 0.50 | 9 ± 1 |

APGAR score at 5 min

Min–Max: 5–10 | 8–10 | 8–10 |
Mean ± SD: 9.20 ± 1.36 | 9.88 ± 0.44 | 9.57 ± 0.59 |
Median ± IQR: 10 ± 1 | 10 ± 0.0 | 10 ± 1.0 |

APGAR, Appearance, Pulse, Grimace, Activity, and Respiration.
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Table 3: Labour outcomes and foetal well-being factors.

| Factors                                      | Frequency (n) | Percentage (%) |
|----------------------------------------------|---------------|----------------|
| Spontaneous vaginal delivery                 | 40            | 48.19          |
| Transfer to an obstetric unit                | 1             | 1.21           |
| Regional analgesia (epidural and/or spinal)  | 0             | 0              |
| Episiotomy                                   | 33            | 39.76          |
| Caesarean delivery                           | 4             | 4.82           |
| Instrumental delivery (forceps or ventouse)  | 3             | 3.61           |
| Complete placental delivery                  | 78            | 100            |
| Incomplete placental delivery                | 0             | 0              |
| Normal foetal presentation                   | 84            | 98.82          |
| Meconium- or blood-stained liquor            | 27            | 31.77          |
| Normal foetal heart rate                     | 58            | 74.36          |
| Presence of caput                            | 24            | 31.17          |

Table 4: Maternal outcome factors.

| Factors                                             | Statistical value* | p value |
|-----------------------------------------------------|--------------------|---------|
| Cervical dilatation                                 | 0.53               | 0.588   |
| Stage of labour                                     |                    |         |
| Stage 1                                             | 3.93               | 0.024   |
| Stage 2                                             | 1.71               | 0.188   |
| Stage 3                                             | 8.64               | <0.001  |
| Rupture of membrane                                 | 1.12               | 0.333   |
| Uterine contraction strength                        | 3.89**             | 0.421   |
| Uterine contraction frequency                       | 3.02               | 0.072   |
| Uterine contraction regularity                       | 0.85**             | 0.654   |
| Tocometric findings                                 | 5.06**             | 0.079   |
| Maternal progression factors                        | 10.55**            | 0.394   |
| Estimated blood loss amount                         | 0.070**            | 0.932   |

*ANOVA, **chi square test.

Table 5: Foetal well-being factors.

| Factors                                             | Statistical value* | p value |
|-----------------------------------------------------|--------------------|---------|
| Foetal presentation                                 | 2.73**             | 0.256   |
| Liquor                                              | 7.11**             | 0.029   |
| Foetal heart rate                                   | 13.99**            | 0.030   |
| Caput                                               | 6.78**             | 0.034   |
| APGAR score (1 min)                                 | 2.10               | 0.130   |
| APGAR score (5 min)                                 | 3.52               | 0.055   |

*ANOVA, **chi square test.

APGAR, Appearance, Pulse, Grimace, Activity, and Respiration.

Foetal outcomes

There was a significant relationship between the foetal well-being factors, such as clear or meconium- or blood-stained liquor, foetal heart rate, presence of caput, and APGAR score at 5 min, and date fruit consumption. The foetal presentation and APGAR score at 1 min showed no significant association with its consumption.

Discussion

In the present study, the women who consumed date fruits before labour had short first and third stages of labour; there were no significant differences between the date fruit consumers and their counterparts regarding cervical dilatation; rupture of membranes; strength, frequency, and regularity of uterine contractions; tocometric reports; maternal progression factors; and estimated blood loss amount. Regarding foetal outcomes, the date fruit consumers were less likely to have meconium liquor staining, foetal heart rate variability, and caput and had better APGAR scores at 5 min. A recent RCT concluded that date fruit consumption did not expedite the onset of labour but reduced the need for augmentation with oxytocin in contrast to the present findings.

In a case-control study conducted in Jordan, in which 69 pregnant women who consumed six pieces of date fruits daily for 4 weeks were compared to controls who consumed no date fruits, the duration of the latent phase of the first stage was shorter in the date fruit consumers, which is in line with the current findings. A short duration of the first and third stages of labour was also found in a recent clinical trial conducted on 91 women who consumed 70–76 g of date fruits from the 37th gestational week, supporting the current findings. Another previous study observed a higher cervical dilatation and intact membranes among date fruit consumers in contrast to the present observation. The number of pieces, duration of consumption, dryness, and type of the date fruits consumed could explain the differences between the two studies. A higher mean cervical dilatation among date fruit consumers was found in the study by Kuran et al., their findings are not in agreement with those in the current study. A plausible explanation could be the different numbers of pieces of date fruits consumed. Kuran and colleagues used 70–75 g of date fruits from the 37th gestational week until delivery; in the current study, seven pieces of date fruits at the onset of labour were given. Several mechanisms have been proposed for the effect of date fruit consumption on labour progression, including the influence on oxytocin receptors, better cervical preparation, and reinforcement of prostaglandin synthesis. Date fruits have anti-oxidant and anti-inflammatory properties and are rich in calcium, which may contribute to the contraction of the smooth muscle of the uterus. Furthermore, they are known to contain 15 types of salts and minerals, in addition to high percentages of vitamins, carbohydrates, and fat. It is hypothesised that date fruits stimulate the uterine muscle to respond more favourably to oxytocin, thus preparing the uterus and cervix for delivery.

The short duration of the first and third stages of labour despite the lack of an effect of date fruit consumption on uterine contraction and cervical dilatation in the present study could be explained by the better preparation of the cervix and saving of energy, leading to a more effective uterine contraction ending in a shorter time for complete dilatation of the cervix and shortening of labour duration. Date fruits are made mainly of simple sugar, and the oxidative pathway is the primary pathway of energy (10 g of glucose is needed every hour). They are a dominant and readily accessible source of energy that provides, saves, and maintains mothers’ power during labour. Khadem et al. found a lesser amount of postpartum haemorrhage in contradiction to our study, in which no significant
difference was found between the pregnant women who consumed date fruits at the onset of labour and controls. The lesser liquor, presence of caput, and variability in the heart rate and better APGAR score at 5 min could be explained by the shorter first stage of labour reported in the current trial. In the holy Quran, date fruits have been introduced as a healthy diet to Mary at the time of giving birth; according to Islamic Hadith, if date fruits were not an abundant food source, God would not have given it to Mary. Among the strong aspects of the current trial is the use of a cheap and readily available source, besides examining the cervix before the intervention and the regular use of tocometry during labour. The limitation of the present study is that we could not control for the diet of the participants. Further trials with the specification of the appropriate number of pieces or amount of date fruits to be consumed and duration of date fruit consumption are needed.

Conclusion

The present study showed favourable effects of date fruit consumption on the duration of the first and third stages of labour. No significant differences were evident between the date fruit consumers and their counterparts regarding cervical dilatation; rupture of membranes; strength, frequency, and regularity of uterine contractions; tocometric reports; maternal progression factors; and estimated blood loss amount. The women who consumed date fruits were less likely to have meconium-stained liquor, caput, and foetal heart rate variability. The APGAR score at 5 min was significantly better among the infants whose mothers consumed date fruits.

Conflict of interest

The authors have no conflict of interest to declare.

Ethical approval

The ethical committee of the University of Tabuk approved the study.

Consent

Informed consent was obtained from all participants included in the study.

Authors’ contributions

I.E. Ahmed, HOM, and MAM conceived and designed the study; TQA collected the data; and YMI interpreted and analysed the data. All authors contributed equally in drafting and critically revising the manuscript before submission. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

Acknowledgment

The authors would like to acknowledge the Deanship of Scientific Research, University of Tabuk, Tabuk, KSA for the financial support provided under grant number S-1438-0055 and King Fahd Specialty Civil Hospital administrators and medical personnel, in particular the nurse staff who shared their experience in this study.

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How to cite this article: Ahmed IE, Mirghani HO, Mesaik MA, Ibrahim YM, Amin TQ. Effects of date fruit consumption on labour and vaginal delivery in Tabuk, KSA. J Taibah Univ Med Sc 2018;13(6):557–563.