Pregnancy

Pregnancy during travel carries important risks that should be considered carefully prior to booking the trip

Key messages

- **With careful preparation, most pregnant women can travel without experiencing health problems.**
- **Pregnant women should see their travel health advisor 6-8 weeks before travel (for those with less time an appointment is still worthwhile).**
- **Women should research health risks and medical facilities at their destination and make sure they have comprehensive travel health insurance prior to travel.**
- **Pregnant women have an increased risk of developing severe malaria and dying from malaria compared to non-pregnant women. If travel to a risk area is essential, careful insect bite avoidance is important, antimalarial tablets should be advised and prompt medical advice should be sought if symptoms of malaria occur.**
- **Inactivated vaccines can be given if protection is needed. Live vaccines pose a theoretical risk to a foetus (unborn child), they may be considered following expert consultation for those at particular risk of disease.**
- **Pregnancy increases the risk of venous thromboembolism (VTE), for travel over four hours, women should mobilise their legs at regular intervals and consider wearing properly fitted, below knee, graduated compression stockings. For those with additional risk factors low weight molecular heparin may be advised.**

Overview

Limited data suggests that many pregnant women travel without experiencing health problems [1]. However, pregnancy during travel carries important risks that should be considered carefully prior to booking the trip.

Pregnant women with a significant obstetric history, an inadequately controlled or newly diagnosed medical condition, or those who are planning to travel to malaria affected areas, or areas without access to medical care, should be advised against non-essential travel.

A careful review of the travel plans, and medical history should guide the pre-travel health advice given. Pregnant travellers should be encouraged to access information on pregnancy and travel.

Destination-specific health advice can be found on the Country Information pages.

Comprehensive travel insurance is essential for all travellers. A full declaration of medical conditions, including pregnancy, should be made to the insurers. Insurance policies differ in their terms and conditions, pregnant women should check that the policy will cover the cost of medical treatment if a pregnancy related problem occurs, including the care of the pre-term baby and repatriation costs if appropriate. All equipment and planned activities should be covered.

Pre-travel preparation

The early pregnancy scan (usually performed between 10 to 13 weeks gestation) should ideally be performed prior to travel to ensure the viability of the pregnancy and confirm the gestation.

Travel with certain pre-existing medical conditions or obstetric complications is not recommended, and specific advice should be obtained from the obstetrician. Conditions such as cervical insufficiency, pre-eclampsia, waters breaking early, placental abruption, suspected ectopic pregnancy and vaginal bleeding are likely to be considered contraindications to travel [3].

Specific advice should also be obtained for those with complicated past or current pregnancies such as history of miscarriage, ectopic pregnancy, infertility or multiple pregnancy (i.e. having more than one baby, twins, triplets etc).

Ante-natal records and next of kin details should be carried when travelling.

Access to the right care may be limited in some areas and emergency plans should be made in advance of travel.

Journey risks

Fitness to fly

Air travel is considered safe in uncomplicated pregnancies up to 36 weeks and up to 32 weeks for a multiple pregnancy [4]. Pregnant women should check the airline's requirements when booking

flights.

After 28 weeks most airlines require a medical certificate confirming the estimated date of delivery and that there are no complications [4].

The date of the return journey should also be considered.

Women with high-risk pregnancies, including placental abnormalities or risk of premature labour, should avoid flying (see details in the pre-travel preparation section).

Cruise line companies may decline to carry pregnant women in the mid to later stages of pregnancy. Pregnant women should check the individual cruise line requirements when booking and consider any restriction relating to connecting flights [5].

Travel-related Venous thromboembolism (VTE)

Pregnancy increases the risk of venous thromboembolism (VTE) including deep vein thrombosis and pulmonary embolism. There is an increased risk of developing a blood clot if sitting for a long time. For journeys over four hours, pregnant travellers should be encouraged to walk around at regular intervals, wear comfortable, loose clothing, regularly flex and extend the ankles to encourage blood flow from the lower legs and sit in an aisle seat if possible [6-9].

Properly fitted, below knee, graduated compression stockings providing 15 to 30mmHG of pressure at the ankle during travel may be considered for pregnant travellers on long-haul flights (more than 4 hours) [6-9].

Those with additional risk factors for VTE should discuss their plans with their midwife or doctor, who may advise low weight molecular heparin [7-9].

Motion sickness

Motion sickness can exacerbate pregnancy-induced nausea [7, 10].

Food and water-borne risks

Unpasteurised dairy products, under-cooked meat and soft cheeses must be avoided during pregnancy. Pregnant women risk serious complications if they contract hepatitis E [3] or other diseases such as listeriosis or toxoplasmosis [1].

The effect of gastrointestinal illness in pregnancy can be significant for both mother and foetus. Careful food, water and personal hygiene should be emphasised.

If treatment for travellers' diarrhoea is required, rehydration salts are considered safe for use in pregnancy [11]; these are relatively cheap and lightweight to carry in the first aid pack. Medical

advice should be sought before using any other medications.

Pregnant women should seek prompt medical attention if they are showing signs of dehydration or if diarrhoea is prolonged, there is blood/mucous in the stool or a fever.

Vector-borne risks

(Including malaria and the viruses chikungunya, dengue and Zika)

All pregnant women who live in or travel to areas where mosquito-borne diseases are known to occur should take measures to avoid being bitten day and night.

The UK Malaria Expert Advisory Group (formerly the Advisory Committee on Malaria Prevention) recommend the use of an insect repellent containing 50 percent DEET for pregnant women; DEET has a good safety record in pregnancy, but ingestion should be avoided [12, 13].

DEET can be applied to natural fibres such as cotton clothing and exposed skin. However, DEET can damage synthetic fabrics and items like plastic watch straps or jewellery, so care should be taken with these items [13].

Pregnant women should also use protective clothing and sleep under an insecticide treated mosquito net, if they are not in air-conditioned accommodation. Although room protection such as screening at the windows is important, it should not be used in isolation, other bite avoidance measures are still required [13].

Malaria

Pregnant women are advised to avoid travel to malarious areas, as they have an increased risk of developing severe malaria and a higher risk of fatality compared to non-pregnant women.

If travel is unavoidable, pregnant women should be informed of the risks of travel to countries where malaria is known to occur, and the risks and benefits of antimalarial chemoprophylaxis [13].

Avoidance of mosquito bites is extremely important in pregnancy, as pregnant women are particularly attractive to mosquitoes, so more susceptible to mosquito bites and therefore more vulnerable to malaria [13].

Ideally, pregnant women should remain indoors between dusk and dawn. If they must be outdoors at night, they should adhere rigorously to bite precautions [13].

Malaria in pregnancy increases the risk of maternal death, miscarriage, stillbirth, premature delivery and low birth weight, with an associated risk of neonatal death [13, 14].

Diagnosis of falciparum malaria in pregnancy can be particularly difficult, as parasites may not be

detectable in blood films due to sequestration in the placenta (red blood cells infected with malaria parasites stick to the blood vessels in the placenta). Placental examination for parasites is recommended in all women who have malaria infection during pregnancy. Expert advice is required at an early stage if malaria is suspected in a pregnant woman. Complications, including severe anaemia, hypoglycaemia, jaundice, renal failure, hyperpyrexia and pulmonary oedema, may ensue [13].

Congenital malaria is rare, but occurs more commonly with *P. vivax* than with the other human malaria parasites [13].

If travel is essential, the '**ABCD**' of malaria prevention should be discussed:

- **A**wareness of the risk
- **B**ite prevention
- **C**hemoprophylaxis (antimalarial medication)
- **D**iagnosis and prompt treatment

Pregnant women and those planning to conceive should be **A**ware of the risks, understand the importance of effective mosquito **B**ite prevention; As DEET has a good safety record in pregnancy, in malaria risk areas pregnant women should use 50%. DEET insect repellents [13]. Appropriate **C** hemoprophylaxis should be taken, and pregnant women should be aware of the symptoms of malaria (particularly high fever) and the importance of prompt **D**iagnosis and treatment.

Contraindications, side effects and drug interactions must be considered carefully prior to prescribing antimalarials in pregnancy.

Chloroquine is safe in all trimesters. However, its major disadvantage is the relatively poor protection it offers against malaria in many areas due to widespread *Plasmodium falciparum* drug resistance [13].

Doxycycline is generally avoided in pregnancy. However, it may, in special circumstances, be considered, if required before 15 weeks gestation where other options are unsuitable. The full course of doxycycline, including the four weeks after travel must be completed before 15 weeks gestation [13]. The UK teratology information service (UKTIS) have further information about the use of doxycycline in pregnancy.

Mefloquine can be offered in all trimesters of pregnancy for travellers to high risk areas (if travel to a high-risk area for *P. falciparum* malaria is unavoidable) although caution is advised in the first trimester). It seems unlikely that mefloquine is associated with adverse outcomes for the foetus. Inadvertent use of mefloquine just prior to or during the first trimester does not constitute grounds to terminate the pregnancy [13].

A review of the manufacturer's global drug safety database covering 1986 to 2010 showed that for mefloquine exposure in pregnancy, the birth defect prevalence and fetal loss in maternal, prospectively monitored cases were comparable to background rates [13].

The decision whether to advise mefloquine prophylaxis in pregnancy always requires a careful harm-benefit analysis. Where the malaria transmission levels and drug resistance make mefloquine an agent of first choice, it is generally agreed that mefloquine may be used in the second and third trimesters of pregnancy. Given the potential severity of falciparum malaria in a pregnant woman, its use is also justified in the first trimester in areas of high risk of acquiring falciparum malaria, such as sub-Saharan Africa [13].

The use of atovaquone plus proguanil (AP) combination preparation in pregnancy is generally **not** advised due to sparse data [12, 13]. However, if there are no other appropriate options, its use may be considered in the second and third trimesters after careful risk assessment [13]. The individual components have shown no adverse effects on parturition (childbirth) or pre- and post-natal development and animal studies show no evidence for teratogenicity [13, 15]. Folic acid 5 mg daily should be taken for the length of time that AP is taken in pregnancy [13].

A study of inadvertent AP use from weeks three to eight after conception identified 149 pregnancies and found no significant association between AP exposure in early pregnancy and risk of a major birth defect [16]. An anonymous, internet-based survey to describe outcomes of pregnancies accidentally exposed to AP identified 10 pregnancies with AP exposure in the first trimester. All resulted in full-term births with no birth defects [17].

A study of 198 women who received AP in pregnancy, 79.8 percent of them in the first trimester, did not show a specific signal to suggest a teratogenic effect, but numbers were too small confidently to determine safety of this combination in pregnancy [18].

A systematic review of the safety of AP for malaria prevention and treatment in pregnancy suggested that the rates of adverse events are not higher than the expected rates in similar populations [19].

Women who have taken AP inadvertently just prior to or during the first trimester should be advised that this does not constitute grounds to terminate the pregnancy [13].

A review of malaria in the pregnant traveller has been published [20].

Pre-conception and antimalarials

Travellers who plan to become pregnant after taking antimalarials and wish to do so with minimal antimalarial drug present, may choose to observe the following time intervals after completing the course, before attempting to conceive [13]:

- One week following doxycycline use.
- Two weeks following AP combination preparation.
- Three months following mefloquine use.

Women planning conception in countries with a high risk of chloroquine-resistant *P. falciparum*

malaria should seek specialist advice.

- Use of mefloquine may be considered after careful risk assessment [13].
- Doxycycline may be considered in special circumstances if the full course including the four weeks after travel will be completed before 15 weeks gestation (see information above) [13].
- Women taking AP who are planning to conceive should receive supplementation with 5mg of folic acid daily (prescription dose) for the length of time that AP is taken.

Chikungunya

Mother to child transmission of chikungunya virus infection has been reported in women who were infected with the virus in the later stages of pregnancy and had fever in the days immediately prior to or during labour [21-23].

Dengue

While pregnancy is not thought to increase the incidence of this disease, pregnant women are at risk of severe complications associated with of dengue infection [23]. Mother to child transmission during delivery has also been associated with severe dengue in newborns [23].

Pregnant women should be informed about the risks of adverse pregnancy outcomes with chikungunya and dengue with some suggesting that pregnant women should consider avoiding unnecessary travel to affected areas, particularly in the third trimester due to the risk associated with mother to child transmission and maternal consequences [23].

A live dengue vaccine is available in the UK (Qdenga®▼). Women of childbearing potential should avoid pregnancy for at least one month following Qdenga®▼ vaccination. The Qdenga®▼vaccine is contraindicated for pregnant and breastfeeding women. See 'Green Book' dengue chapter for further details.

Zika

Zika virus is a cause of Congenital Zika Syndrome (microcephaly and other congenital anomalies) [23, 24]. In areas where there is evidence of a current outbreak of ZIKV with significant transmission, pregnant women are advised to postpone non-essential travel until after the pregnancy.

In areas where recent outbreaks have been previously reported, re-introduction of ZIKV or endemic transmission has occurred, pregnant women are advised to consider postponing non-essential travel until after the pregnancy.

Recommendations for affected countries are found in the 'Other Risks' section of our Country Information pages. If travel to a risk area is essential, pregnant women should be aware of this risk

and they should be scrupulous with mosquito bite avoidance day and night. Also, pregnant women who visited Zika risk areas while pregnant, or who become pregnant within 2 months after their last possible Zika exposure*, should contact their GP, obstetrician or midwife for further advice, even if they have not been unwell.

This advice does not apply to areas considered to be at "very low risk" of ZIKV (see Country Information pages). Further information on Zika is available from the UK Health Security Agency.

***Last possible Zika virus exposure is defined as the later of either the date of leaving a country or area with risk for ZIKV transmission, or the date on which unprotected sexual contact with a potentially infectious partner took place.**

Vaccination

Health professionals should refer to the relevant chapters in UK Health Security Agency, Immunisation against Infectious Disease 'Green book' for information about specific vaccines before vaccinating a pregnant woman.

Non-live vaccines

A recent a comprehensive review of the evidence on safety of various non-live vaccines during pregnancy (those based on inactivated virus, inactivated bacteria, and the acellular vaccines and toxoids) revealed no safety issues. Pregnancy should not preclude women from vaccination with these vaccines if medically indicated [25-27]. Unfortunately, uptake of vaccination programmes for pregnant women has been low in some areas [28]. Barriers to vaccination in pregnancy are complex and vary depending on context and population [28].

Since September 2012, pertussis (whooping cough) vaccine has been offered to all pregnant women in the UK (including those previously immunised), during pregnancy. This vaccination programme was introduced in response to increased levels of pertussis activity across the UK. The aim is to boost immunity to pertussis in the mother during pregnancy and optimise placental transfer of antibodies to the unborn baby; protecting the infant in the early weeks of life before they can receive their own vaccination (from 8 weeks) [29]. This inactivated vaccine is given in combination with low dose diphtheria and tetanus.

Pertussis vaccination is currently recommended for pregnant women from 16 weeks to 32 weeks of pregnancy, although the vaccine can be offered after 32 weeks [29]. Pertussis vaccination administered before 16 weeks gestation may not provide adequate protection against pertussis for the infant; pregnant women requiring protection against diphtheria, tetanus or polio for travel before 16 weeks gestation should be offered Revaxis®. Such women will, in addition, receive the routine pertussis vaccine at an appropriate time during their pregnancy; a four-week minimum interval between vaccines is recommended [30]. It is important to note that the recommended pertussis vaccine in pregnancy does not contain polio, so if polio protection is required for travel, an additional vaccination with Revaxis® will be needed [30].

Live vaccines

Most live vaccines are contraindicated or not recommended in pregnancy because of the theoretical risk that the live attenuated virus or bacteria (in the vaccine) may cross the placenta and infect the foetus. However, some live vaccines may be considered in circumstances where the risk of disease outweighs the risk of live vaccination during pregnancy [25, 26, 31]. Specialist advice should be sought when travel is essential and live vaccines are being considered.

Yellow fever vaccination should generally be avoided, on theoretical grounds, during pregnancy [31]. However, where travel to a high-risk area for YF cannot be avoided, the vaccine can be considered following individual risk assessment, which should consider potential risk from the vaccine and risk of exposure to YF disease [25, 31].

The dengue vaccine Qdenga®▼ is contraindicated in pregnant and breastfeeding women, see ' Green Book' for further details.

Inadvertent administration of a vaccine (live or inactivated) during pregnancy does not constitute grounds to terminate the pregnancy [27].

In order to expand the safety data available on vaccines for pregnant women, health professionals should ideally report details of vaccine use during pregnancy to the UK Teratology Information Service, a group commissioned by UK Health Security Agency, as well as to the vaccine manufacturers.

COVID-19

Pregnant women are considered to be clinically vulnerable to COVID-19 and have been included in the groups to continue to receive COVID-19 vaccination in the UK (see Table 3 in Immunisation against Infectious Disease). A COVID-19 vaccination guide is available from UKHSA for pregnant and breastfeeding women. Also see guidance on the safety of COVID-19 vaccines when given in pregnancy from UKHSA.

All individuals should follow current UK recommendations to reduce their risk of catching COVID-19 and passing it on to others.

Pre-conception and vaccines

Vaccinating prior to conception is preferable to vaccination during pregnancy. However, because of the theoretical risk of live vaccine virus transmission to the foetus, women should be advised to delay conception for 28 days after receiving live vaccines.

Other health risks

Altitude

There is a lack of data on the effects of exposures to high altitude during pregnancy [32]. It is prudent to avoid high altitude in the first trimester and advisable that at least one scan has been performed to confirm a healthy intrauterine pregnancy [33]. After 20 weeks gestation short stays (hours to days) at altitudes up to 2,500m without heavy exercise in women with uncomplicated pregnancies are thought to pose minimal risk [34].

The World Health Organization (WHO) state that travel to sleeping altitudes over 3,000m or to remote areas is not advisable during pregnancy [10].

Women with complicated pregnancies of any gestation should avoid travel to high altitude travel including those with anaemia, chronic or pregnancy-induced hypertension (or risk factors for pre-eclampsia), impaired placental function (ultrasound diagnosis), intra-uterine growth retardation, maternal heart or lung disease and unexplained bleeding.

The Summary of Product Characteristics for acetazolamide states that this drug should not be used during pregnancy, particularly during the first trimester [35].

Heat

Body temperature regulation is not as efficient during pregnancy. In addition, an increase in core temperature, such as with heat stroke, may harm the foetus [3]. If visiting countries with hot climates pregnant women should consider choosing accommodation with air-conditioning and restrict activities in the heat.

Psychological health

Anxiety during pregnancy can be exacerbated by travel. These issues should be discussed prior to travel and/or specialist advice sought when necessary.

Medical care

Pregnant travellers should pack a first aid kit that will also help them manage relevant, common issues affecting pregnant women such as constipation, haemorrhoids, indigestion and morning sickness.

Before travel, it is sensible to research the medical facilities available at the destination. Pregnant women should also know when to seek prompt medical advice, for example if they experience abdominal pain, bleeding, contractions, prolonged diarrhoea or signs of dehydration, fever, rupture of membranes, signs of preeclampsia, vomiting or other concerning symptoms.

It is advisable to carry the emergency contact numbers for the insurance company, who should be

contacted early if medical help is required.

Resources

- Royal College of Obstetricians and Gynaecologists. Green-top Guidelines No 54A. The prevention of malaria in pregnancy
- World Health Organization. SAGE Working Group on Yellow Fever Vaccine
- Galang R, Caroll D, Oduyebo T. Pregnant Travellers. In: US Centers for Disease Control (CDC) 'Yellow book' Health Information for International Travel 2024
- Royal College of Obstetricians and Gynaecologists. Air travel and pregnancy: Information for you
- NHS: Travelling in pregnancy
- Food and water hygiene
- Insect and tick bite avoidance
- UK Health Security Agency: Zika and Pregnancy
- Zika virus: Evaluating the risk to individual traveller

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