

Natural FORCES



Candida represents a 'natural' case for alternative therapies for resistant pathogens, says Mayur Joshi.



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WHAT YOU WILL LEARN

- > What *Candida* is and why it is on the increase
- > Antibiotics increase the risk of infection
- > Natural remedies to integrate with conventional medicines

Candida can be isolated in the vaginal tracts of 20 to 30% of healthy, asymptomatic, non-pregnant women at any single point in time, and in up to 70% if followed over a one-year period¹. It is also found in the mouth and the gastro intestinal (GI) tract^{2, 3, 4, 5}.

The presence of *Candida* does not invariably lead to infection and, consequently, *Candida* can be considered a member of the normal microflora of humans⁶. The microflora is the population of microscopic organisms that inhabit and live in a symbiotic relationship with the human body. This includes the bacterial populations that reside in the human gastrointestinal tract, an important mechanism in the defence against commensal infections.

While it is considered part of the normal microflora, it is a pathogenic organism that can cause infection with serious implications in terms of morbidity and mortality if the balance between colonisation and the host is temporarily disturbed.

Candidal infections are the most common fungal infection worldwide with *Candida albicans* species the most common responsible organism⁷. Several pathogenic *Candida* species have been isolated but *Candida albicans* remains the most common, responsible for up to 85% of infections. The most frequent manifestations of genitourinary candidiasis include vulvovaginal candidiasis (VVC) in women, balanitis and balanoposthitis in men, and candiduria in both genders.

These diseases are remarkably common but

occur in different populations, healthy as well as immunocompromised. It is estimated that 75% of women experience at least one episode of VVC during their childbearing years, of whom about half have at least one recurrence⁸. Among the many causes of vaginitis, VVC is the second most common after bacterial vaginosis (BV) and is diagnosed in up to 40% of women with vaginal complaints in the primary care setting⁹.

Although uncomplicated VVC is usually easily managed with anti-fungal agents, complicated VVC is more difficult to manage. For many women who suffer from repeated episodes of VVC, the recommended treatment of long-term suppression and maintenance therapy provides short-term relief; however, up to 50% relapse within months of finishing treatment¹⁰. Not only can it be very difficult to manage but the incidence of *Candida* infections also continues to rise, especially among



GRAPEFRUIT SEED EXTRACT

Grapefruit seed extract (GSE) derived from grapefruit contains a number of bioflavonoids (semi essential nutrients) contained within the peel, flesh and seeds of the fruit. As well as having known antimicrobial and anti-fungal activities, these natural compounds are powerful antioxidants and have gastro-protective properties³².

The antimicrobial and anti-fungal activity is well known and has been documented for a number of years³³. A study by Reagor *et al* found that GSE was anti-bacterial in action to 67 biotypes and was comparable to other proven anti-bacterials³⁴. The same researchers attributed this action to the relatively low pH of the grapefruit seed extract – being crucial in establishing an environment prohibitory to bacterial life.

It is important to use a good quality grapefruit extract with a high concentration of bioflavonoids and not containing any synthetic preservatives, which are potentially toxic. These synthetic compounds can also give false antimicrobial effects, which make up for the lack of anti-bacterial flavonoids present.

GARLIC

Garlic (*Allium sativum*) has a long history of use as an antibacterial or antifungal agent with the earliest recorded use as a medicine likely to be the therapeutic formulas written in the *Codex Ebers*, an Egyptian medical papyrus dating to approximately 1550 BC. It has been used through the centuries by many different cultures and in the last century the exact properties of garlic have been well researched. Garlic bulbs contain a non-odiferous chemical called alliin (S-allylcysteine sulfoxide). When crushed, an enzyme called alliinase (normally enclosed in a separate compartment unless the cell is damaged) is mixed with the alliin, resulting in the formation of allicin (diallyl thiosulfinate, the initial odiferous compound within garlic). It appears that it is the breakdown products of allicin that have the antifungal effect *in vivo*²⁸.

The anti-pathogenic effects of garlic have long been studied and much is known about the way in which it exerts its effects. Several researchers have summarised the laboratory work that has identified the complex pathways involved. Garlic extracts have been shown to decrease the oxygen uptake of *Candida*, reduce the growth of the organism, inhibit the synthesis of lipids, proteins, and nucleic acids and damage to cell membranes^{29, 30, 31}. Its antifungal effects have been studied extensively and this has helped to confirm its already long-standing use as a medicine. However, few clinical trials exist probably due to the low benefit for researchers.

hospitalised patients¹¹.

In addition to the increasing frequency of infection there has also been an increase in non-*Candida albicans* infections as well as increased resistance to anti-fungal drugs such as fluconazole. For example, *C glabrata* has increased as a cause of invasive candidiasis in the USA from 18% of all isolates in the time period of 1992-2001 to 25% in 2001-2007 with a concomitant increase in fluconazole resistance from 9% to 14%¹². One of the main consequences of drug resistance is the increase in fungaemia (or bloodstream infections) with resulting increases in serious morbidity and potential for life-threatening infections.

The increase in incidence of *Candida* infections can, in part, be attributed to the greater use of broad-spectrum antibiotics that disturb the microflora. *In vitro* studies have shown that colonic microflora reduces *Candida* numbers, and *in vivo* studies have shown that the use of broad-spectrum antibiotics increases the risk of candidal infection^{5,13,14}. Antibiotics kill or inhibit bacteria, but leave fungi unaffected. With the bacteria of the gut microflora disturbed, there is opportunity for *Candida* numbers to increase substantially and subsequently cause infection.

Another factor in the increased incidence of *Candida* infection is the greater use of corticosteroids and other immunosuppressive agents that alter the functioning of the immune system¹⁵. The relevance of a weakened immune system is reflected in the fact that leukaemia patients carry higher levels of *Candida*, and patients with HIV virus are much more likely to develop candidiasis¹⁶.

As a result, novel therapies to help prevent and protect against *Candida* infections is increasingly becoming attractive. In addition, there is wider acceptance of the role of natural remedies and their potential to be used alongside conventional medicines in order to

PROBIOTICS

A healthy vaginal bacterial balance is said to be high in beneficial strains of *Lactobacilli*, which are known to create an acidic environment that inhibits the growth of potential pathogens, therefore protecting women from infection. *Lactobacilli* are most commonly the dominant microorganisms in the vagina of healthy premenopausal women. They block and prevent the *Candida* species' colonisation, adhesion, invasion and growth, by producing lactic acid (which maintains a low pH in the vagina) and other substances such as hydrogen peroxide (H₂O₂) and bacteriocins (which are directly toxic to *Candida*) thus preventing overgrowth^{17,18,19}.

Antibiotic therapy, spermicide use, oral contraceptives, oestrogen therapy, diabetes mellitus, tight clothing and frequent sexual intercourse are factors that increase the risk of overgrowth and consequently development of VVC²⁰. Many of these factors disturb the balance of healthy vaginal microflora.

As such, the ability to redress and support the vaginal microflora with probiotics has potential protective and therapeutic effects. The accepted definition of a probiotic is a live microorganism that, when administered in adequate amounts, confers a health benefit on the host²¹. By introducing beneficial species of bacteria the microflora of the gut and vagina are supported in their role in preventing overgrowth of *Candida*.

The benefits of probiotics in the prevention of VVC have been assessed with some positive results. They have been assessed as both oral supplements and as topical vaginal therapies. Several studies by Reid and colleagues showed that the oral administration of *Lactobacilli* could significantly alter the microflora of the vagina, significantly increasing *Lactobacilli* numbers and reducing the presence of yeasts such as *Candida albicans*; in the process reducing incidence of yeast vaginitis^{22,23,24}.

This work built on studies by Hilton *et al* who showed that oral intake of *Lactobacilli* significantly reduces colonisation and infection by *Candida*²⁵. The same researchers also showed that intravaginal introduction of a *Lactobacillus* reduced symptoms of VVC, work that was supported by Williams *et al* who also found that the probiotic was almost as effective as a prophylactic intravaginal anti-fungal drug at reducing risk of developing VVC^{26,27}.

Care must be taken when choosing a probiotic as quality and efficacy does vary. Properties of probiotic bacteria are strain-specific making generalisability of evidence very difficult, but the evidence supporting the use of specific strains is growing. At present, the best products tend to contain more than one strain of probiotic and this is likely true for VVC. There is also variability in the manufacturing quality of probiotic products, another consideration to make when choosing a product.

Overall the potential for probiotics to be used in the prevention of VVC is high and routine use will likely become the norm as the volume of research grows.



COCONUT OIL

Like garlic there is a long-standing, historical association between the intake of coconut oil and the reduction in *Candida* infections. Virgin coconut oil contains three medium chain fatty acids – lauric acid, caprylic acid, and capric acid – all of which have an antifungal effect against *Candida* and other fungi³⁵.

The mechanism by which the lipids kill bacteria is not fully understood, but electron microscope studies indicate that they disrupt cell membranes. Variations in genetic composition of *Candida* species has been postulated as the main reason for inconsistencies in research but various *in vitro* studies have demonstrated potent anti-*Candida* effects of caprylic acid and capric acid^{35,36}.

Again, as in the case with garlic, there is little clinical trial evidence to support the use of coconut oil but there is sufficient pre-clinical work to consider it as a potential preventative agent alongside other products.

maximise protection and treatment (this is not only true of *Candida* infections). Here, we look at some of the evidence supporting the use of various natural agents.

SUMMARY

There is strong evidence for the use of probiotics and other natural supplements to help in the prevention and management of fungal infections. With the growing need for alternative therapies for resistant pathogens, there is increased interest in these types of novel therapies. It is likely that no single supplement will confer full protection and a combination of some of the above seems like the most effective way to help counteract the overgrowth of *Candida* and subsequent infection.



REFERENCES

Please go online to www.naturalhealthcareinthecommunity.co.uk/knowledge/candida to follow the full list of references as you read this article.

OTHER NATURAL PRODUCTS

There are a number of other natural supplements that have been presented as having strong anti-*Candida* effects through various mechanisms. *Echinacea* is well known as a natural way to protect against the cold by boosting the immune system through its ability to activate phagocytes³⁷. It has also been used as a natural anti-*Candida* agent. Mouse model work suggests that this effect is also mediated by its immune-boosting properties, albeit through different pathways³⁸. Essential oils such as origanum oil have also been shown to have anti-fungal activity with studies again demonstrating this effect in animal models of *Candida* infection^{39,40}.