Canad. M. A. J.
Sept. 1, 1957, vol. 77

INTESTINAL MONILIASIS IN ADULTS

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INTRODUCTION

(a) *Presence of "Candida" species in stools.* Species of the genus *Candida* have been isolated from fæcal material repeatedly since Langenbeck[18] found them in the intestines at autopsy in 1839. However, it is difficult to compare and discuss these findings for various reasons. In many instances no attempt was made to identify the yeasts, while other authors merely state "yeasts seen on smear". Furthermore, the methods of isolation varied. It is obvious that the media used by bacteriologists for the routine isolation of intestinal bacteria do not provide optimal growth conditions for *Candida* species. Therefore, any estimate of the number of *Candida* species isolated from stool specimens has to be evaluated with great caution.

Le Dantec[21] found filamentous yeasts in great numbers in fæces of patients suffering from sprue, and believed sprue to be a *"véritable blastomycose intestinale"*. Castellani and Low,[9] however, thought of yeasts only as secondary invaders in cases of sprue. Ashford[2-4] constantly isolated a yeast-like fungus, *Monilia psilosis* Ashford, 1914, from the inflamed tongue and fæces of persons suffering from sprue in Puerto Rico. More than 20 years later, Langeron and Guerra[19] studied Ashford's original strains and identified them as *Candida albicans*. Ashford[3] found the same yeast in the centre of a cooked loaf of bread in an endemic area. He was able to prove that his isolated strains were pathogenic for small laboratory animals, which developed severe septicæmia with incurable mycotic ulcers. Ashford[2] found his *Monilia psilosis* (*Candida albicans*) in only 3% of persons who were apparently healthy, or at least free from gastro-intestinal disturbances. In 1917, Anderson[1] examined the stools of 175 persons; 37% of these specimens yielded yeasts on culture. Although he included pink colonies, probably non-pathogenic *Rhodotorula* species, in his counts as well as colourless strains, he concluded that yeast-like organisms were present only in relatively small numbers in stools of healthy persons. Fleisher and Wachowiak[15] found three "*Monilia*-like organisms" on examination of 92 stools of normal persons. Hannibal and Boyd[16] concluded from their observations that there is no specific relationship between yeasts and sprue. Unfortunately, the work of Nye, Zerfas and Cornwell[24] provides no reliable identification of the yeasts isolated from stools; however, it might be mentioned that they found a higher incidence of yeast-like fungi in the gastric contents from patients with achylia.

Benham and Hopkins[6] isolated 18 *C. albicans*, 13 *C. krusei* and 2 *C. parapsilosis* strains from the stools of 100 normal persons. Todd[31] examined the fæces of 1000 healthy persons, and found *C. albicans* in 9.3% of the males and 18.2% of the females. Of 314 stools, 33.1% were found by Schnoor[27] to contain *Candida* species, mostly *C. albicans*. Pasricha and Lal[25] reported a very abundant growth of "yeasts" from stools in India, but their work does not include any attempt to identify the "yeasts" and therefore becomes meaningless. *C. albicans* was isolated by Swartz and Jankelson[30] three times from 24 cases of non-specific ulcerative colitis. Lawler, Omundson and Donald[20] believe that there is no relationship between *Candida* species and intestinal parasites in the gastro-intestinal tract although the number of isolated *Candida* species reported is rather high. A high incidence of *Candida* species was also observed by Felsenfeld[14] in the fæces of "institutionalized patients". *C. albicans* was found in 19.3% of 300 new admissions and in 37.7% of 600 ward cases. Other *Candida* species (*C. parapsilosis, C. krusei*) were isolated in much smaller percentage. A correspondingly high incidence of *C. albicans* was encountered by Marples and Di Menna[22] in New Zealand. They found that 30.8% of the stools of children investigated harboured *C. albicans*.

In 1955, the Department of Bacteriology and Immunology, McGill University, Montreal, received 517 and 505 clinical specimens of stool from adults and children respectively, for bacteriological examination. The following *Candida* species were isolated, using the routine media for the isolation of the intestinal bacterial flora:

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	Adults	*Children*
C. albicans	13	23
C. krusei	3	2
C. pelliculosa	1	
C. parapsilosis		4
C. guilliermondii		4
C. scottii		1
Unidentified		1
	17	35

As has been previously mentioned, the routine media used for the isolation of intestinal bacterial flora from fæces do not provide optimal growth conditions for *Candida* species. Therefore, we decided to investigate the incidence of *Candida* species in stools of apparently healthy persons with no gastro-intestinal complaints. We used Sabouraud's glucose agar containing antibiotics (penicillin, streptomycin, actidione) the exact composition of which will be given later. Stool specimens were received from 126 males (mostly McGill students) and 152 females (mostly nurses of the Royal Victoria Hospital and McGill students). The mycological examination of these stool specimens gave the following results:

	Male	*Female*
Very heavy growth of *C. albicans*	8	11
Heavy growth of *C. albicans*	12	23
Moderate growth of *C. albicans*	5	7
Light growth of *C. albicans*	4	14
Very heavy growth of *C. krusei*	1	
No growth of yeast-like fungi	96	97
Totals	126	152

(b) *Increased occurrence of "Candida" species in stools of persons after treatment with antibiotics.* One of the side-effects of antibiotics, especially the so-called broad-spectrum antibiotics, is the sudden massive appearance of *Candida* species inside the body and on its surface.[13, 33] While *Candida* species might have been present before, without causing any clinical symptoms or any discomfort, they suddenly appear to have become more pathogenic. The same holds true for cows treated for bacterial mastitis with antibiotics.[7] Harris[17] gave a good clinical description of such signs and symptoms in the intestinal tract, and Weyler[32] described the additional skin irritation around the anus due to aureomycin. Acute prostatitis or proctocolitis was noticed one to three weeks after the use of aureomycin or terramycin was discontinued.[26] Brown[8] found an increased number of *C. albicans* colonies in stools after aureomycin therapy. The same observation was made by McGovern *et al.*,[23] who found that the average amount of *C. albicans* increased from three to eight days after treatment. Chewning[10] described colitis following the oral administration of aureomycin and terramycin, and Smith[29] concluded that the disturbance of the normal bacterial œcology by the administration of antibiotics was responsible for the development of such hitherto unestablished new clinical syndromes. An impressive report of the effect of aureomycin on the appearance of "yeasts", unfortunately not identified, came from the Mayo Clinic. Dearing and Heilman[12] examined the bacterial flora of the intestinal tract of people given aureomycin for preoperative preparation. Sixty-six patients received 750 mg. aureomycin, q.i.d. orally, and "yeasts" appeared in the stools of 36. When the dosage was reduced to 500 mg., only 2 of 11 stools yielded growth of "yeasts". With a further reduction to 250 mg. the growth of "yeasts" was not induced in any of the specimens examined. The same held true for Sulfathalidine preoperative treatment. With Sulfasuxidine preparation only 2 of 32 stools contained "yeasts". When 750 mg. aureomycin q.i.d. and 500 mg. dihydrostreptomycin q.i.d. were given, 14 of 18 specimens grew "yeasts", and a dosage of 500 mg. dihydrostreptomycin q.i.d. brought about growth of "yeasts" in 1 of 9 specimens. Sharp[28] investigated the growth of *C. albicans* during and after terramycin and sulfadiazine therapy in patients with pneumonia. In the terramycin group (a five-days' course of an average dosage of 14.2 g.) the proportion of rectal swabs from which *C. albicans* was grown rose from nil to 59%. While there was no increase in incidence of *C. albicans* during treatment in the sulfadiazine group, the proportion of rectal swabs which grew *C. albicans* rose from 5 to 20% 2-4 days after discontinuing treatment.

INVESTIGATION OF CASES OF INTESTINAL MONILIASIS IN ADULTS

Since the significance of massive occurrence of *Candida* species in stools has not yet been fully investigated, we have felt that further studies of intestinal moniliasis among adults might bring to light more information about this currently ill-defined condition. Therefore, over the past three years we have studied cases of gastro-intestinal disturbance in which no cause for the symptomatology could be found and in which stool cultures have yielded heavy growths of *Candida* species.

(a) *Bacteriological and mycological methods.* Bacteriological examination of the stool specimens included the search for *Salmonella* and *Shigella* species, *Staphylococcus pyogenes*, and pathogenic *Escherichia coli* species. For this purpose, the following media were used: tetrathionate broth, SS agar "Difco", MacConkey agar "Difco", blood agar and Chapman medium.

To examine for the presence of *Candida* species, stools were streaked on three 22 x 175 mm. slopes. Two of these contained Sabouraud's glucose agar "Difco" in which 20 units/ml. penicillin and 40 units/ml. streptomycin were included, and the third contained the same medium with 0.5 mg./ml. actidione.

(b) *Case histories.*—We have encountered 50 cases in which *C. albicans* was found to be the causative organism of gastro-intestinal disturbances. For technical reasons only seven representative cases will be reported here.

Mrs. E.B., aged 34. This patient had been treated for a pneumonia with injections of penicillin in 1948. Some time after this, she complained that she was suffering from gas and flatus, recurring mild crampy abdominal pains, loose stools, and abdominal distension, but no pruritus ani or vulvæ. She was found to have amœbiasis in 1953 and was treated with emetine, carbarsone, diodoquin, and chloroquine in 1953 and 1954. Regular sigmoidoscopic examinations since then have revealed no evidence of amœbiasis.

Investigation of her gastro-intestinal tract, including barium enema, barium meal, and sigmoidoscopy, done in November 1954, did not reveal any organic abnormality. No amœbæ were found. However, the stool cultures showed, besides a light growth of *E. coli*, a heavy growth of *C. albicans.*

The patient was given a course of gentian violet, 30 mg. t.i.d., for three weeks. This treatment resulted in an almost complete relief of her signs and symptoms. Stool cultures done after this treatment yielded no *C. albicans*, but a moderate growth of *E. coli* and light growth of *Proteus mirabilis.*

In March 1955, the same signs and symptoms recurred and a stool culture disclosed a very heavy growth of *C. albicans*, and *E. coli.* No evidence of amœbiasis was found on sigmoidoscopy. The patient was given nystatin (Mycostatin), one tablet t.i.d., for one week, and gentian violet, 30 mg. t.i.d. for three weeks, which gave excellent results clinically. A follow-up culture showed only a very light growth of *C. albicans* and a heavy growth of *E. coli.* The patient was free from gastro-intestinal complaints.

Bleeding from rectal mucosa and passing mucus, but not diarrhœa, recurred at the end of June 1956. A stool culture done on July 10, 1956, produced again a very heavy growth of *C. albicans.*

Mr. B.H.W., aged 35. This patient had been given broad-spectrum antibiotics for an occasional "cold". Early in 1955, he developed marked pruritus ani and an extensive seborrhœic dermatitis in the perineum as well as in the axillæ and on the feet, but moniliasis was not recognized. He also suffered from much gas, flatus and soreness in the abdomen, as well as occasional loose stools. During the whole year 1955 he had constant pains in the rectum with occasional spontaneous bleeding at defæcation. Sigmoidoscopic examination showed only a friable mucous membrane; no ulceration could be detected. Barium examinations did not disclose any organic abnormality. Various treatments were tried without much success.

In September 1955, he was given erythromycin and neomycin for scattered boils. The dermatitis of the groins, perineum and axillæ became worse after this treatment.

In December 1955, scrapings from the groins, perianal region and feet revealed the presence of yeast-like fungi, and cultures yielded a very heavy growth of *C. albicans.*

In February 1956, the stool cultures showed a very heavy growth of *C. albicans.* No bacteria were grown from this specimen.

The intestinal moniliasis was treated with Mycostatin, one tablet t.i.d. for a week, to be followed by gentian violet, 30 mg. t.i.d. for three weeks.

The relief of his rectal pains, gas, flatus, and abdominal pains was dramatic—within three days after starting on Mycostatin. Furthermore, corresponding to this relief of gastro-intestinal complaints, a stool specimen cultured a week after the beginning of treatment revealed the complete absence of *C. albicans* as well as a light growth of a *Paracolobactrum* species and *Staphylococcus pyogenes.* Two weeks after this treatment had been started, the patient, who lives in Quebec City, stated in a letter: "The one thing which has improved tremendously is the internal burning and itching when I have a bowel movement. Since I started the internal medication I have had practically no burning or itching. I have no diarrhœa any longer. It is really wonderful to be able to defæcate almost like a normal person".

Skin scrapings from the various sites involved continued to yield cultures of *C. albicans.*

On March 27, 1956, a stool specimen showed a very light growth of *C. albicans* and a heavy growth of *E. coli.*

The patient then reduced the dosage to two gentian violet pills (30 mg.) instead of the three he had been taking before. Thereafter, the stool culture yielded a heavy growth of *C. albicans* besides a moderate growth of *E. coli* and *S. pyogenes* (April 8, 1956). The patient was advised to return to the original dosage. A very light growth of *C. albicans*, a moderate growth of *Aerobacter aerogenes* and a heavy growth of *Streptococcus fæcalis* were found in a stool specimen on May 2, 1956. The patient continued to take 30 mg. gentian violet t.i.d., and was practically free of all previous gastro-intestinal complaints while on this treatment.

Mrs. E.P. aged 40. In January 1955, the patient was suffering from pneumonia and was given Achromycin (tetracycline) for ten days. She developed loose stools and a burning feeling in the rectum immediately. The patient had one or two loose stools in the morning, and another one or two at later times daily. Furthermore, she passed mucus and some liquid bowel contents.

The persistent signs and symptoms induced the patient to come for examination early in May 1955. Barium meal, barium enema, and sigmoidoscopic examinations failed to demonstrate any organic abnormality. Stool examinations for amœbæ were all negative. A stool culture on May 6, 1955, revealed a very heavy growth of *C. albicans* and a moderate growth of *E. coli.* It was felt that the fungus might be the cause of her disturbances.

On May 16, 1955, treatment with gentian violet was started. The patient received 30 mg. gentian violet, t.i.d. for one week, and b.i.d. for the following week. The dosage was reduced to 30 mg. daily the third week. On June 20, 1955, the patient felt much better and the stools became formed after this date. A stool specimen cultured at this time showed only a light growth of *C. albicans* besides a moderate growth of *E. coli.* The patient was then given Mycostatin (nystatin), one tablet t.i.d. for four days, followed by a ten-days' course of gentian violet, 30 mg. t.i.d. Thereafter, this treatment was repeated. On August 3, 1955, the stool cultures revealed only a rare colony of

C. albicans in three large tubes, and a moderate growth of *E. coli*. The patient felt well and when seen on September 15, 1955, all previous gastro-intestinal signs and symptoms had disappeared or decreased.

Mr. G.B., aged 44. In June 1953, he complained of loose stools and abdominal discomfort, which he had noticed off and on for the previous four months. At this time, a barium enema and a barium meal, with small bowel follow-through, did not show any organic abnormality. Sigmoidoscopic examination showed no lesion of the mucous membrane, but swabs revealed the presence of *Entamœbæ bütschlerii*. He was given a course of terramycin, 250 mg. q.i.d. for one week. After this treatment he developed burning sensations in the rectum and persistent pruritus ani, and the loose stools continued. Some hæmorrhoids appeared and were injected. However, the pruritus persisted. An anticholinergic drug did not improve the loose stools or discomfort.

In December 1953, a stool culture revealed a heavy growth of *C. albicans*. The patient was given gentian violet, 30 mg. t.i.d. for ten days. This treatment was repeated after a three weeks' interval. At the end of February 1954 he felt much better. The diarrhœa, abdominal discomfort, and the pruritus ani had stopped. A stool culture at this time, and again in April 1954, showed no yeast-like fungi to be present. Bacteriological examinations of these stool specimens indicated moderate and heavy growth of *E. coli* respectively.

He had no recurrence of the previous signs and symptoms, and another stool culture in February 1956 showed only a very light growth of *C. albicans* besides a moderate growth of *E. coli*.

Mrs. M.S., aged 50. This patient was first seen in December 1952. She had been suffering from constant diarrhœa—never more than five stools daily—during the previous year. Other complaints were of much gas, flatus, abdominal distension, abdominal pains, and a very distressing burning in the rectum. No antibiotics had ever been taken by this patient.

X-ray examination revealed a functioning gall-bladder containing many radio-opaque stones. A barium meal and sigmoidoscopy did not reveal any organic abnormality. A gastric analysis showed the presence of free hydrochloric acid. A barium enema disclosed a minimal diverticulosis of the sigmoid colon. Repeated stool examinations gave no evidence of amœbiasis. Stool cultures yielded a heavy growth of *C. albicans* besides a normal intestinal flora.

A low roughage diet and antispasmodic drugs were prescribed. This treatment resulted in some relief of the diarrhœa, but all other symptoms remained unchanged. Furthermore, the patient now complained of pruritus ani and increasing fatigue.

In November 1953, the stool specimens still gave growth of numerous colonies of *C. albicans*. A ten days' course of Entero-vioform, one tablet t.i.d., did not relieve any of her symptoms.

In February 1954, a stool culture again revealed a heavy growth of *C. albicans*. Gentian violet, 30 mg. t.i.d. for one week, was prescribed and the same treatment was repeated three weeks later. Whereas the first course of gentian violet did not reduce the growth of *C. albicans* from a stool specimen, the second almost eliminated the yeast-like fungus from the stool, as well as suppressing the formation of gas and flatus. The diarrhœa had stopped, but the other symptoms persisted.

Another course of gentian violet treatment was then tried. However, the results were not satisfactory and a stool specimen in May 1954 showed a heavy growth of *C. albicans* and the normal flora of bacteria.

The dosage of gentian violet was now raised and 60 mg. t.i.d. was given for three weeks. There was no relief of any of the symptoms and the drug caused more diarrhœa. Stool cultures done during and after this course of treatment continued to demonstrate a very heavy growth of *C. albicans* and a moderate growth of *Proteus mirabilis* and *Paracolobactrum intermedium*.

During the summer of 1954 the patient tried yoghurt milk without any benefit. The stool cultures, too, remained unchanged.

In September 1954, Hibitane (1:6-di-4-chlorophenyl-diguanido-hexane) was given for a number of weeks. The dose was increased gradually from 100 mg. t.i.d. to 600 mg. t.i.d. Although the diarrhœa and the pruritus ani diminished, the stool cultures, done once a month, always showed a very heavy growth of *C. albicans* and a light growth of *E. coli*.

A cholecystectomy was done in January 1955. Recovery was uneventful.

In February 1955, Mycostatin, one tablet t.i.d., was given for eight days. All her signs and symptoms disappeared or decreased. Four days after termination of this treatment a stool specimen grew only *E. coli*; no yeast-like fungi were found in the cultures.

Within several weeks, however, all her signs and symptoms returned and stool cultures again produced a heavy growth of *C. albicans*.

The condition persisted until January 1956, when she reported again. The patient admitted that she had practically no more flatulence or pruritus ani, but still had diarrhœa with urgency of going to stool. Gas and belching were her outstanding complaints. Stool cultures again showed a heavy growth of *C. albicans* besides a light growth of *E. coli*.

This time she was given lozenges containing 5 mg. of cetyldimethylbenzylammonium chloride to suck 8-10 times daily. No change occurred either in the patient's condition or in the stool cultures (a very heavy growth of *C. albicans* and a light growth of *E. coli*) at the conclusion of the treatment. Since quaternary ammonium compounds are destroyed in an alkaline medium, such as is found in the gastro-intestinal tract, no improvement could have been expected.

Mrs. F.T., aged 70. In June 1953, the patient complained of fatigue, excessive gas and belching, abdominal distension, lower abdominal pains, and pruritus ani from which she had been suffering for several months. She also complained of chronic constipation for many years; she never had diarrhœa and had never taken any antibiotics.

The gall-bladder was found to be normal on x-ray examination. Barium enema showed a moderate spasticity of the left half of the colon. Barium meal with small bowel follow-through and sigmoidoscopy did not demonstrate any organic abnormality. A gastric analysis, done later, indicated normal amounts of free hydrochloric acid. Repeated stool examinations revealed no evidence of amœbiasis; however, the stool cultures demonstrated a very heavy growth of *C. albicans*.

Sodium iodide, 600 mg. t.i.d.p.c., was given, but because of symptoms of iodism the treatment had to be stopped.

In August 1953, her barium studies were repeated and again did not reveal any pathological features. The moniliasis persisted. Another physician prescribed aureomycin, vitamin B complex injections and daily taking of yoghurt milk. This treatment did not influence her condition.

In November 1953, the patient was given a two weeks' course of gentian violet, 30 mg. t.i.d., which did not alleviate her condition nor did it change the number of *C. albicans* colonies cultured from the stool specimens.

In January 1954, the patient took Entero-vioform for one week and then gentian violet, 60 mg. t.i.d., for two weeks. Her gas, belching and distension, fatigue and pruritus ani became much relieved, and only a light growth of *C. albicans* was obtained on culture of a stool specimen at that time. However, a month later, a stool culture showed a heavier growth of *C. albicans* and her complaints had again become more pronounced.

From March to September 1954 the patient received a number of courses of gentian violet, 30 mg. t.i.d. for

two weeks at a time. The treatment seemed to reduce the formation of gas and distension, but the other signs and symptoms always recurred. Monthly stool cultures revealed a very heavy growth of *C. albicans* and a light to moderate growth of *E. coli* and *S. fæcalis.*

In September 1954 Hibitane (1:6-di-4-chlorophenyl-diguanido-hexane) was given. The dose was gradually increased from 100 mg. t.i.d. to 1000 mg. t.i.d. The drug produced neither ill effects nor any improvement of the condition. Stool cultures remained unchanged as well.

In October 1954, she was given gentian violet, 60 mg. t.i.d., for two weeks and then Mycostatin, one tablet t.i.d., for two weeks. While she stayed on this latter preparation the stool cultures yielded only a light growth of *E. coli* and no yeast-like fungi. All her signs and symptoms diminished or disappeared, only to recur as soon as the medication was stopped.

Stool cultures done in December 1954 and January 1955 revealed a very heavy growth of *C. albicans* and a heavy growth of *E. coli* and light growth of *S. fæcalis.*

Mycostatin, one tablet t.i.d., was again given for eight days in February 1955. The stool culture became negative for *C. albicans*; there was only a light growth of *E. coli* and *S. fæcalis.* Her condition was very much improved.

The signs and symptoms accompanied by a heavy growth of *C. albicans*, light growth of *E. coli* and light growth of *P. mirabilis* recurred in March 1955. A six weeks' course of treatment with Mycostatin, one tablet t.i.d., improved her condition considerably. *C. albicans* had disappeared from the stool cultures and there remained only a heavy growth of *E. coli.*

In June and September 1955 stool cultures revealed a moderate growth of *C. albicans, E. coli* and *P. mirabilis* and the patient continued to feel much better.

In November and December 1955 treatment with Mycostatin, one tablet t.i.d., was continued for three weeks. The patient felt much better while on this course of medication. The improvement lasted for several weeks after the conclusion of this treatment.

A stool culture on January 22, 1956, demonstrated again a heavier growth of *C. albicans* besides a heavy growth of *E. coli.* At the end of January 1956, the patient was complaining again of gas and abdominal distension, pruritus ani, and actual burning with some excoriation around the anus. Cultures from swabs taken from a sore tongue revealed the presence of *C. albicans.* An examination of the stool in March 1956 disclosed a very heavy growth of *C. albicans* and a heavy growth of *E. coli.* Her signs and symptoms remained unchanged.

Mrs. F.W., aged 73. This patient was admitted to the Royal Victoria Hospital in the beginning of November 1953. She was suffering from diabetes and diabetic neuropathy as well as a chronic cystitis. There were no gastro-intestinal complaints at the time of her admittance.

Her diabetes was controlled with diet and insulin. After investigation, the urinary tract infection was treated with terramycin, 250 mg. q.i.d. By the eighth day of treatment with terramycin she had developed a severe diarrhœa, and also complained of crampy pains, weakness and loss of appetite. Stool cultures showed a very heavy growth of *C. albicans.* No other pathogenic micro-organisms were cultured.

Gentian violet, 60 mg. t.i.d., was given over a period of one week. The same treatment was repeated two weeks later.

No growth of yeast-like fungi was obtained on culture ten days after the gentian violet treatment had been discontinued.

There have been no more bouts of diarrhœa or gastro-intestinal complaints during the following two years. Several stool cultures were done in February 1956. They showed a light growth of *Pseudomonas æruginosa* while the yeast-like fungi had completely disappeared.

DISCUSSION

(a) *Diagnosis and symptomatology of intestinal moniliasis.* The *Candida* species are fungi of a low and varying degree of pathogenicity. Therefore it is hard to evaluate the meaning of the presence of *Candida* species in stools, even if they are present in large numbers.

Intestinal moniliasis in adults is characterized by some or all of the following signs and symptoms: (1) Recurrent diarrhœa or even constant loose stools, generally not more than 4-5; after some months stools might become soft, 1-2 daily: (2) excessive gas, flatus, and abdominal distension; (3) abdominal pains, often crampy; (4) pains in the rectum, sometimes burning in character; (5) pruritus ani; (6) occasional bleeding from rectal mucosa, at defæcation or even entirely spontaneously.

The establishment of such a diagnosis requires the ruling out of all other possible causes by means of barium studies, sigmoidoscopy, and bacteriological and parasitological investigative methods. If these examinations prove negative and a significant growth of *Candida* species is obtained from stool or sigmoidoscopic swabs on a suitable medium, a diagnosis of intestinal moniliasis should be considered.

In our series, these requirements were met. Furthermore, when treatment resulted in relief or disappearance of symptoms and signs, there was a corresponding reduction or absence of *Candida* species in the stool cultures. On the other hand, the recurrence of signs and symptoms was always associated with the reappearance or heavier growth of the *Candida* species in the specimens.

We have never observed a spontaneous disappearance of *C. albicans* from stool specimens.

In each of our cases a complete bacteriological investigation of the intestinal flora was done and revealed the presence of the usual intestinal bacteria.

We are fully aware that there are cases in which a heavy growth of *Candida* species from stool specimens is observed and the patients have none of the previously described signs and symptoms. In fact, we have observed and followed such cases during the last three years. A parallel might here be drawn between such cases and the frequent presence of *C. albicans* in the oral cavity without causing the signs of thrush. The same holds true for the bacterial

flora of the nasopharynx (pneumococci and streptococci).

(b) *Treatment.* In our experience, neither sodium iodide, Vioform, Hibitane nor cetyldimethylbenzylammonium chloride produce any beneficial results.

Nystatin (Mycostatin) treatment resulted in dramatic reduction or disappearance of *C. albicans* from stools on culture, generally accompanied by clinical improvement. However, as soon as the Mycostatin treatment was discontinued there was either a much increased growth or a reappearance of *C. albicans* in the stool cultures together with the return of the clinical signs and symptoms. One explanation of this phenomenon may be the fact that *C. albicans* can invade and parasitize the intestinal wall, as shown by Beemer, Pryce and Riddell.[5] Mycostatin, because of its physico-chemical properties,[11] would be unable to get into close contact with the fungus there and thus completely eradicate the causative organism in the gut.

Administration of Mycostatin, however, proved to be the most valuable procedure in corroborating the diagnosis and establishing the symptomatology of intestinal moniliasis.

So far, gentian violet seems to be the most useful therapeutic agent although clinical cure was secured in only a few cases. Cases of short duration seem to be more amenable to treatment than those of long standing.

SUMMARY

The literature on the presence and on the increased occurrence of *Candida* species in cultures of stool specimens after treatment with antibiotics is reviewed. A survey revealed the incidence of *Candida* species in stools of young adults (males 23.8%, females 36.2%).

Seven case histories representative of 50 cases of intestinal moniliasis diagnosed and followed during the last three years are reported. The study of this series of cases of intestinal moniliasis allowed us to elicit the necessary diagnostic procedure and to establish the symptomatology of intestinal moniliasis. Intestinal moniliasis was found to be characterized by a heavy growth of *Candida* species, especially *C. albicans*, on stool culturing, and the presence of all or some of the following signs and symptoms: loose stools or diarrhœa, bleeding from the rectal mucosa, flatulence, formation of gas, distension, abdominal pains, pain in the rectum, and pruritus ani.

In a few cases only, treatment with gentian violet produced an apparent cure. Treatment with Mycostatin resulted in only a temporary improvement of the condition corresponding to the temporary disappearance or the reduced growth of *Candida* species from the stool cultures.

Intestinal moniliasis has been shown to be a well-defined clinical entity which occurs more frequently in adults than is generally accepted. This condition is demanding more attention. It can easily be diagnosed by the procedure—including the use of Mycostatin (nystatin)—followed in our series.

The authors are indebted to Drs. C. Miller Ballem and R. D. McKenna for permission to include their cases in this series.

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RÉSUMÉ

Cet article débute par une revue des auteurs ayant contribué à l'étude de l'espèce *Candida* dans la culture des selles après administration d'antibiotiques. On a relevé la présence de ce micro-organisme dans les selles de jeunes adultes (23.8% chez les hommes, 36.2% chez les femmes). Les faits cliniques de sept malades sont présentés, extraits d'une série de 50 cas diagnostiqués dans les trois dernières années. Cette série a permis aux auteurs de cet article d'établir la symptomatologie de cette affection ainsi les procédés diagnostiques nécessaires à son dépistage. Ceux-ci consistent en une croissance abondante de *Candida*, particulièrement du *C. albicans* dans les selles. Les symptômes comprennent de la diarrhée, une muqueuse rectale hémorragique, de la flatulence, du ballonnement, des douleurs abdominales et rectales et du prurit anal.

Le violet de gentiane n'apporta une guérison apparente que dans quelques cas. La MYCOSTATINE (nystatine) ne donna qu'une amélioration passagère se traduisant par une diminution ou une suppression temporaires du *Candida* dans les selles. La moniliase intestinale est une entité clinique bien établie qui se retrouve chez l'adulte et requiert plus de soins qu'on ne lui en a apporté jusqu'à présent. On peut arriver au diagnostic par les moyens indiqués ci-haut, y compris l'emploi de la nystatine.