



FACULTY OF PHARMACY
Tripoli

LIMU
Benghazi



Co-Prescribing of Probiotics & Antibiotics Against Entero-Pathogenic Bacteria

Raja Moftah Moman

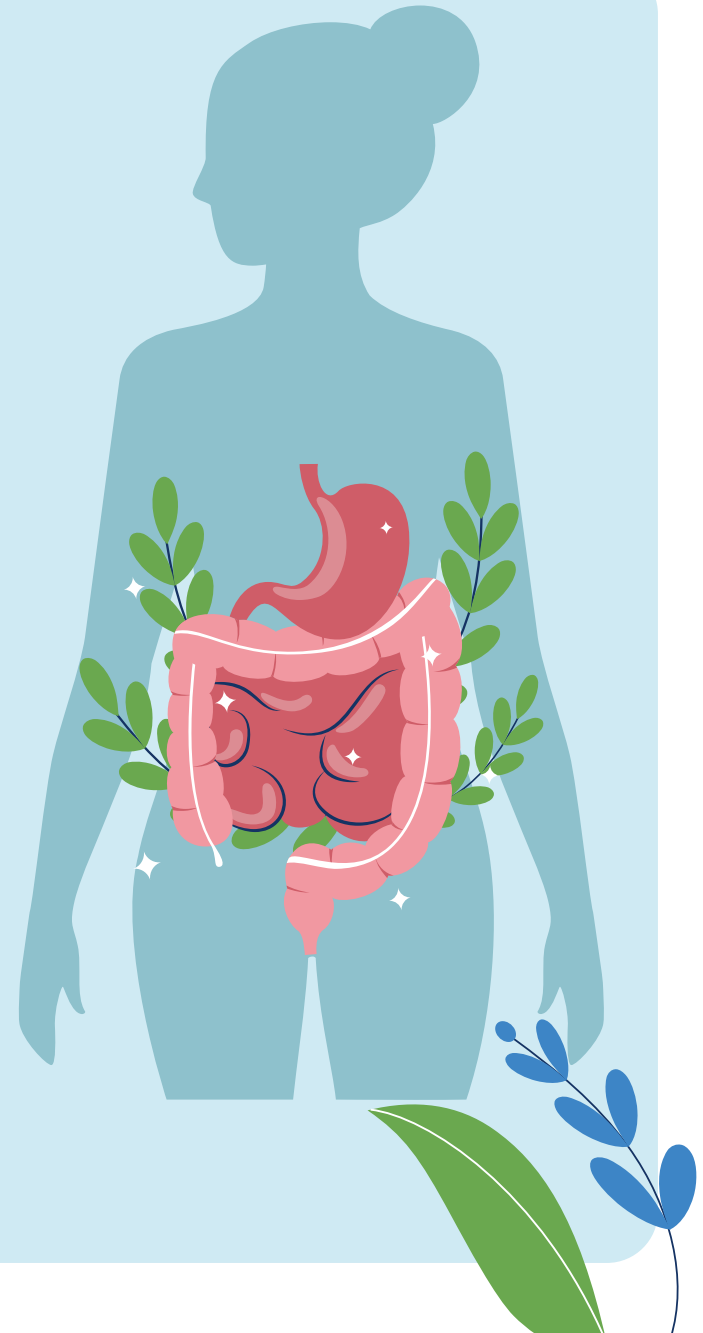
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THE AGENDA

01

**REPLACEMENT
THERAPY**

02

**IMPORTANCE OF
INTESTINAL HEALTH**

03

**MATERIALS
AND METHODS**

04

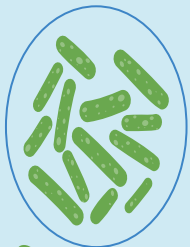
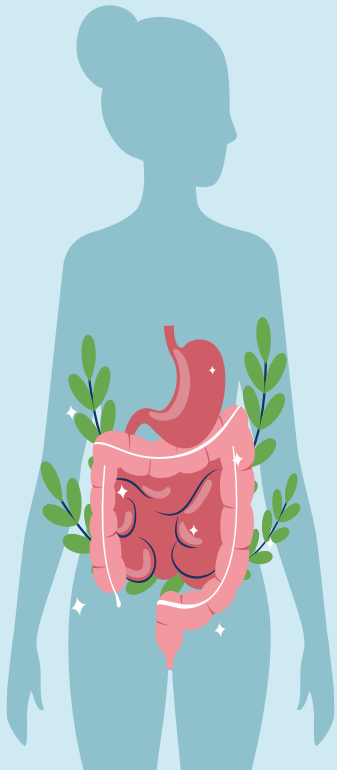
RESULTS

05

DISCUSSION

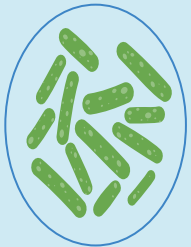
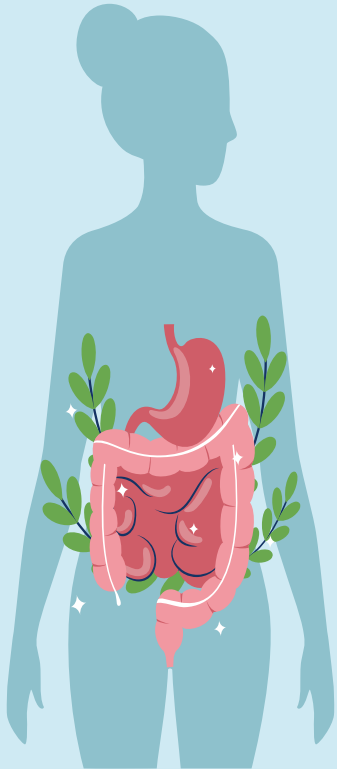
06

RECOMMENDATIONS



*The 25th Conference of the Scientific Association of Colleges of Pharmacy in Arab World
The 1st International Conference of the Faculty of Pharmacy of LIMU
2-3 November 2024, Benghazi - Libya*

PROBIOTICS & ANTIBIOTICS



01

INTRODUCTION TO REPLACEMENT THERAPY

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REPLACEMENT THERAPY

- **Replacement therapy** or **probiosis** is an approach proposed replacement of potential pathogenic microorganisms with less virulent genetically modified organisms in the treatment of some diseases.
- There are some important requirements for this type of therapy to be applied such as the used microorganism must not cause disease, must persistently colonize and should possess a high degree of genetic stability.
- **Probiotics** have been applied successfully in intestinal tract and in the vagina to reduce the incidence of some disorders by modulation of bacterial populations.

WHAT IS A PROBIOTIC?

- **Probiotics** defined as living microbes, or as food ingredients containing living microbes, that beneficially influence the health of the host when used in **adequate numbers**.
- Probiotics according to **WHO** “live microorganisms which, when administered in adequate amounts, confer a health benefit on the host”
- These microorganisms belong to the natural human flora and can survive the acidity throughout transportation to the intestines and have been reviewed to achieve many targets in the digestive system such as **colonization resistance, modification of intestinal environment and immune system modulation**.

COMMON TYPES OF PROBIOTICS

Several strains used as probiotics including:



Lactobacillus

- ✓ *Lactobacillus rhamnosus* GG,
 - ✓ *L. casei*.
 - ✓ *L. reuteri*.
 - ✓ *L. plantarum*,
 - ✓ *L. brevis* CD2
-



Bifidobacterium

- ✓ *Bifidobacterium animalis*.
 - ✓ *Bifidobacterium lactis*.
 - ✓ *Bifidobacterium longum*
-



Streptococcus

- ✓ *Streptococcus salivarius*
 - ✓ *Streptococcus thermophiles*
-



Yeast

- ✓ *Sacchomyces cereviasae*
-

WHAT IS AN ANTIBIOTIC?

- Substance produced by microorganism, that is detrimental to other microorganisms.
- Commonly are produced by soil microorganisms.
- Introduced to the world in 1941 (**Penicillin**).
- Since then they have revolutionized the treatment of bacterial infections in humans and other animals.
- Ineffective against viruses.

NATURAL SOURCES OF PROBIOTICS



Yogurt



Kefir



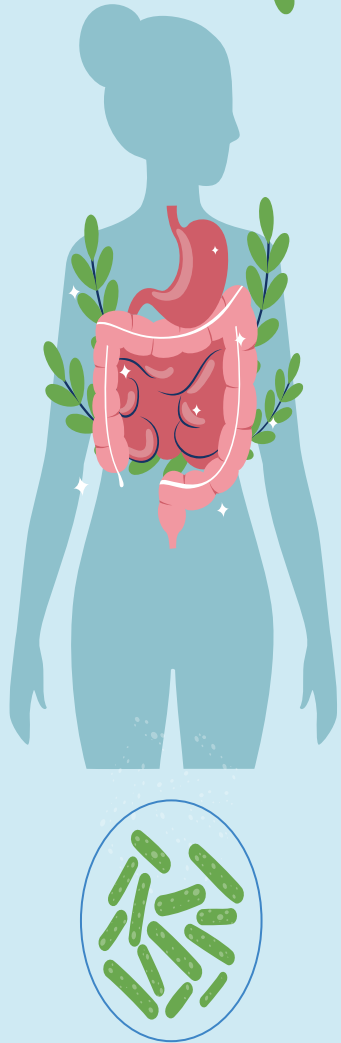
Sauerkraut



Kimchi



PROBIOTICS & ANTIBIOTICS



02

IMPORTANCE TO INTESTINAL HEALTH

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SOME BENEFICIAL BACTERIA FROM OUR GUT

Gut health Impact

- Digestion.
- Immunity.
- Mental health.
- Inflammation.
- Weight.
- Skin health.

Beneficial bacteria



- *Lactobacillus*

- *Bifidobacterium*

- *Bacteroides fragilis*

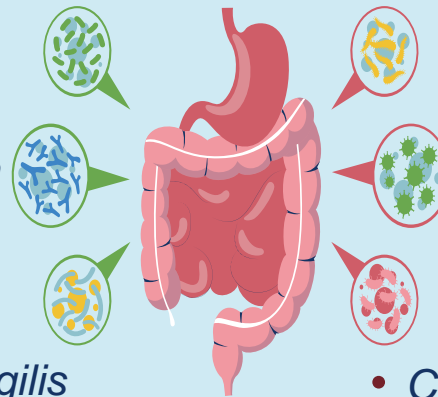
Pathogenic bacteria



- *Helicobacter pylori*

- *Salmonella*

- *Campylobacter*




ENTEROPATHOGENIC BACTERIA

- The most common facultative anaerobic species in the intestine is *Escherichia coli* (*E. coli*).
- The majority of strains are essential to the preservation of gut function and are not harmful.
- One of the main causes of infantile diarrheas' is **Enteropathogenic *E. coli*** (EPEC).
- First **reported in 1955**, EPEC strains were epidemiologically linked to outbreaks in the 1940s and 1950s.
- Currently, **1.3 million fatalities** annually are attributed to these strains. Since the advancement of molecular biology, the incidence is now being recorded more precisely.



THE WORK QUERY

- Some of our pharmacist colleagues noted that **almost all the probiotic prescriptions** they receive in their pharmacies are **co-prescribed with antibiotics**.
 - They **asked** many questions about if the antibiotics will affect the benefits of probiotics or vice versa and we noted **a lack of knowledge** about **probiotics** among the pharmacists.
- 

AMIS OF THE WORK

The **targeted** group were the **pharmacists** who are working at pharmacies in different places in Tripoli city.

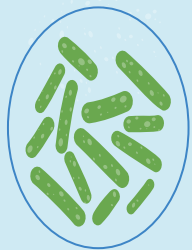
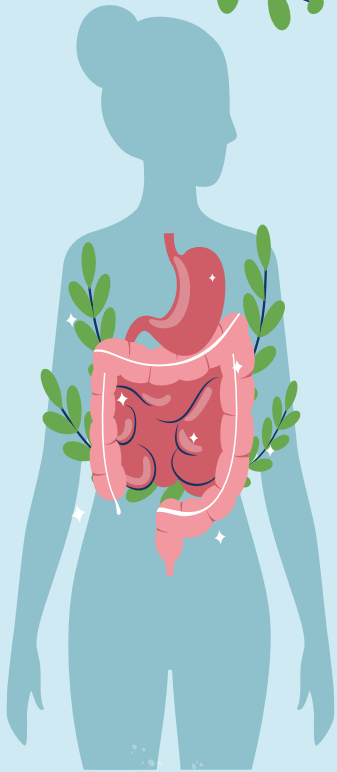
Study **aimed** to find out:

- Their knowledge about probiotics.
- How they're dealing with probiotics because they're the most professionals interacted with public and asked for medical advice with or without prescription.



Pharmacy

PROBIOTICS & ANTIBIOTICS



03

MATERIALS & METHODS



Materials & Methods



Participants

Pharmacists were recruited randomly from private pharmacies in central area of Tripoli city. Pharmacists were invited to volunteer to complete a questionnaire to be filled at the pharmacy.

Questionnaire

questionnaire represents the opinion of a random sample of pharmacists, aiming at introducing the extent of co-prescribing between probiotics and antibiotics

Study period

The study carried on in February 2020 – August 2020 (During Covid-19 outbreak)

Part I

Meta-analysis regarding reports related to the effect of probiotics and antibiotics against enteropathogenic bacteria as a concomitant therapy.

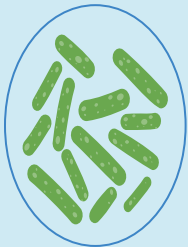
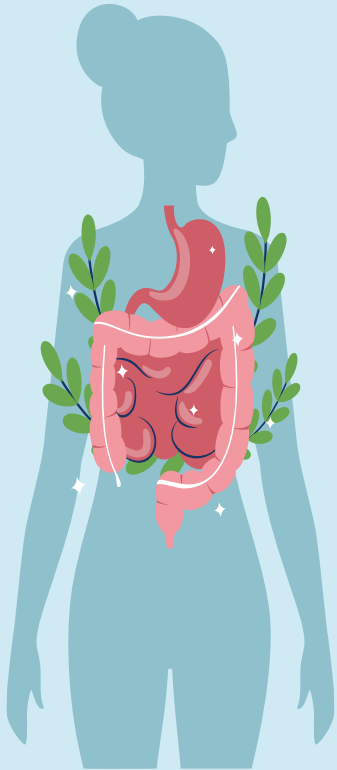
Part II

A questionnaire targeted a group of pharmacists to find out their knowledge about probiotics and their use.

PROBIOTICS & ANTIBIOTICS

04

RESULTS



Observed articles

Observed articles were (20) and the average length of studies was around 3 weeks to 6 months.

Questionnaires

A total of 100 surveys were distributed; surveys were returned (49 pharmacies). 20 surveys were left blank, and some participants did not meet the inclusion criteria (not graduated pharmacists).

Ages

ages ranged from 20 to 47 with a mean age of 33.5 years

Questionnaires



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Demographics of participants

CHARACTERISTICS	NO. (%)
Age, mean (range)	33.5 (20-47)
Sex	
Male	19 (36.54)
Female	33 (63.46%)
Education level	
Bachelor's degree	43 (82.69%)
Pharmacy diploma	06 (11.55%)
One or more years of training/ college	03 (5.76%)
Do not wish to answer	0 (0%)



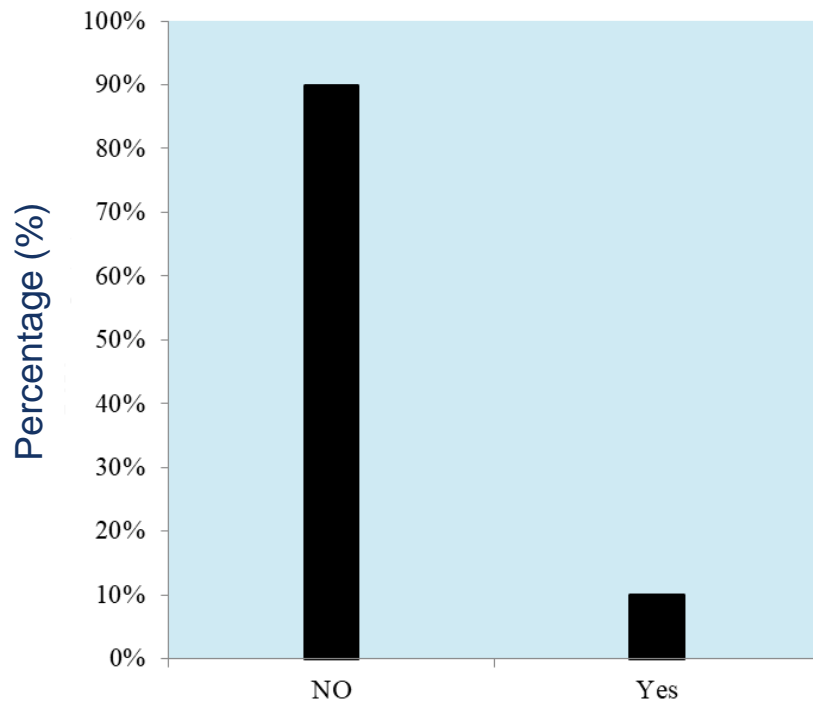


Fig 1 Are you familiar with Probiotics?

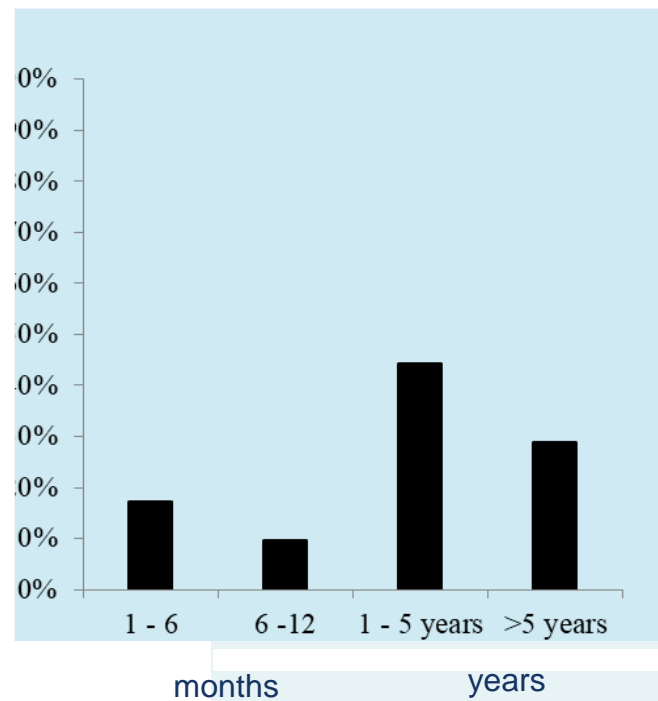


Fig 2 Duration of employment

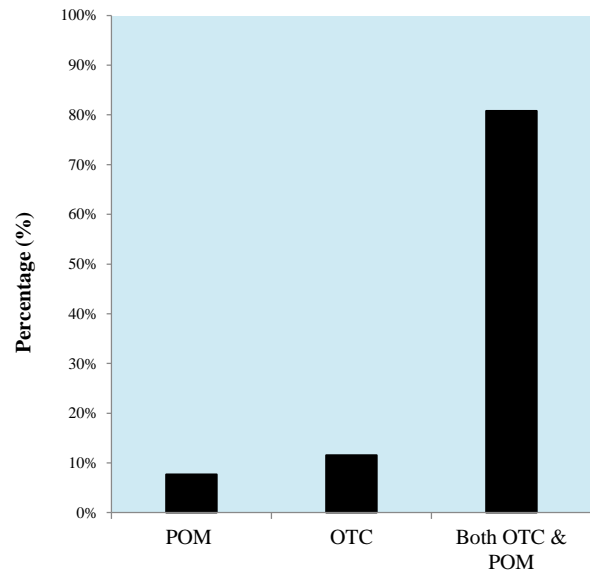


Fig 3 Are probiotics POM, OTC or both?

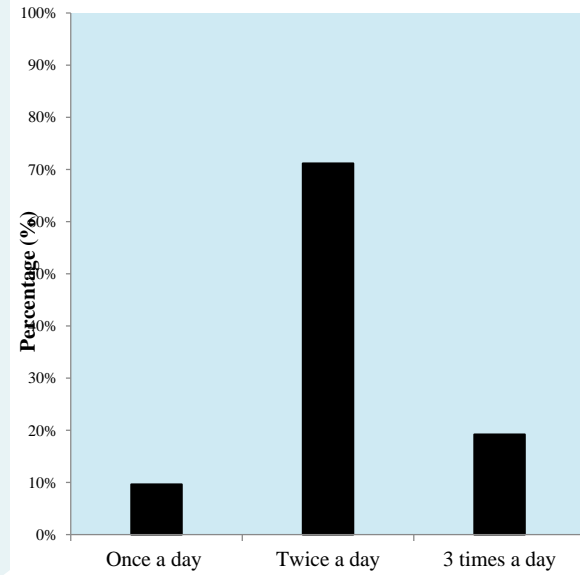


Fig 4 The frequency to take probiotic

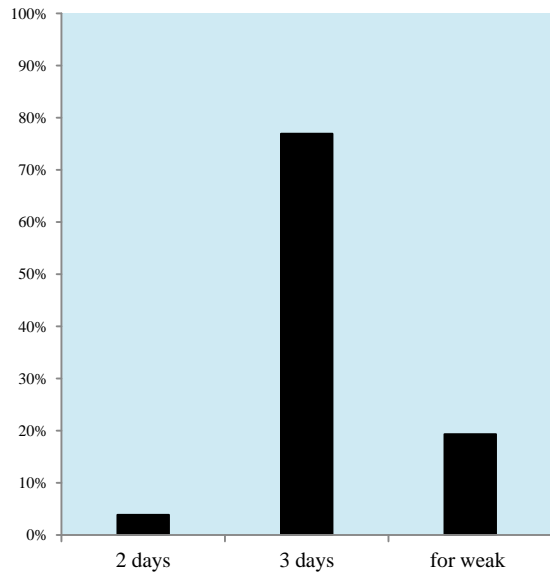


Fig 5 Duration of probiotics use

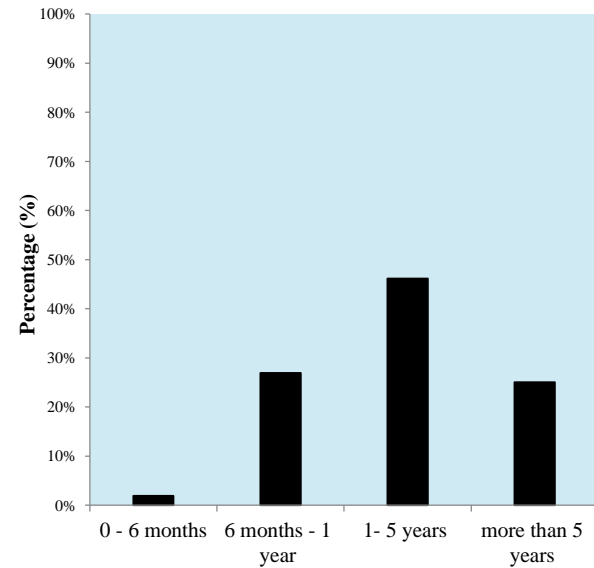


Fig 6 Age of the patients

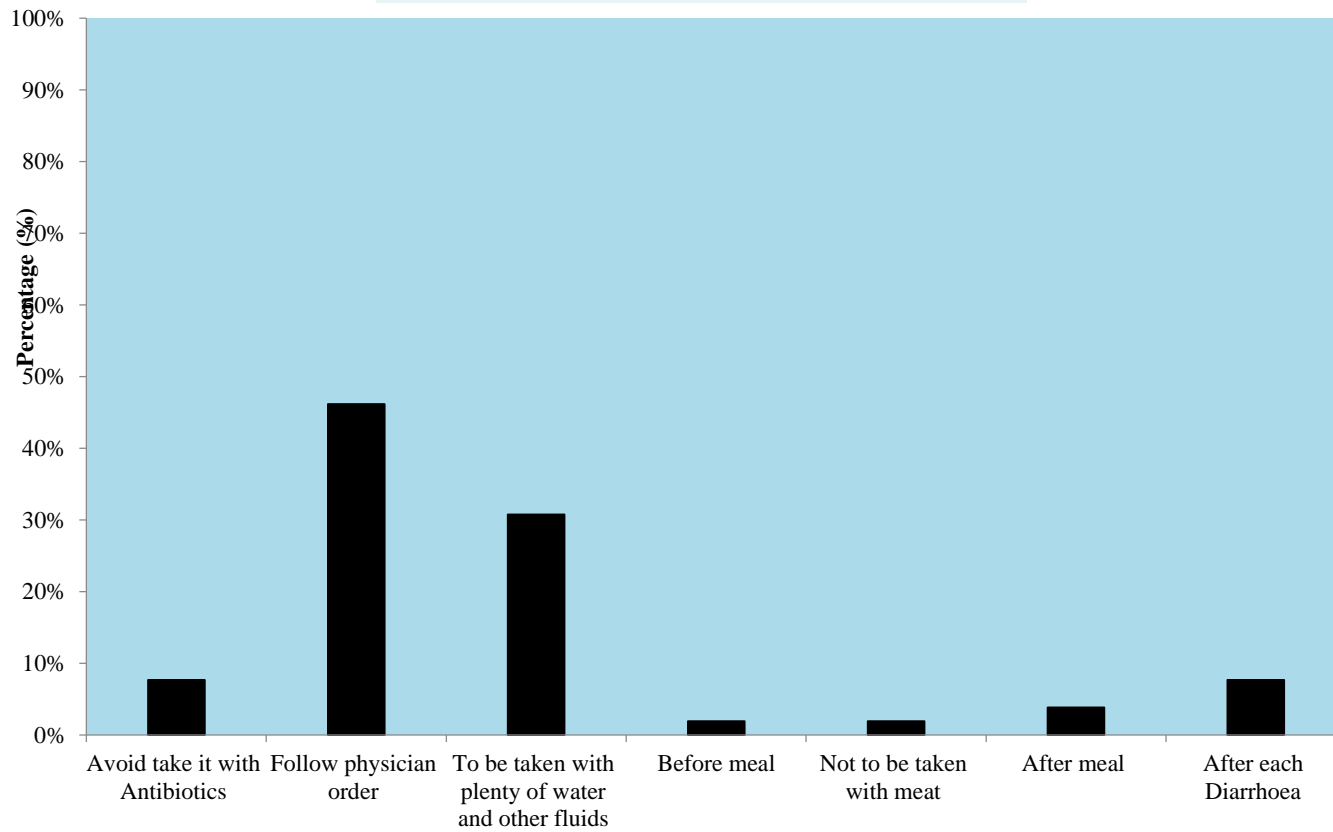


Fig 7 Advice usually given to the patient when dispensing probiotics

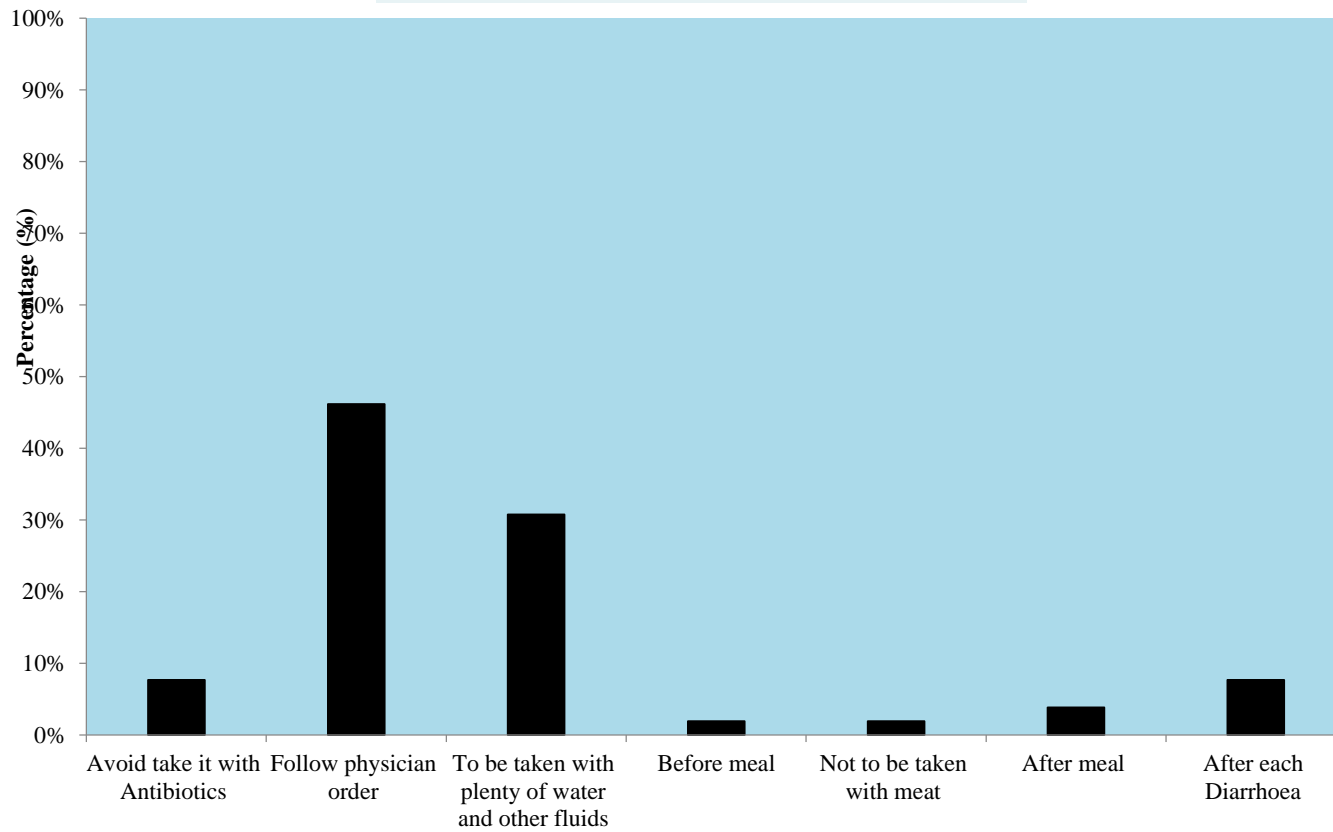


Fig 7 Advice usually given to the patient when dispensing probiotics

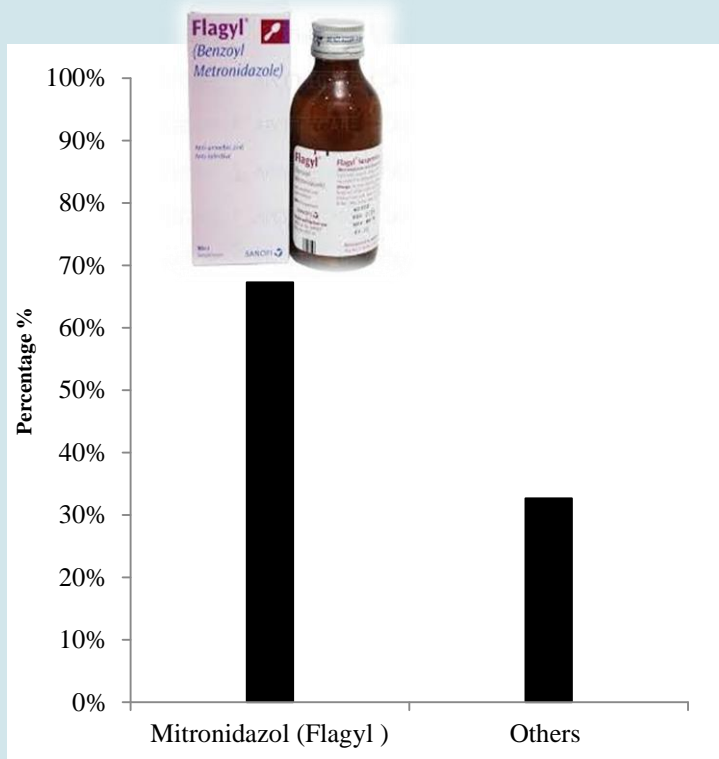


Fig 8 Most co-prescribed antibiotic (67% is Flagyl)

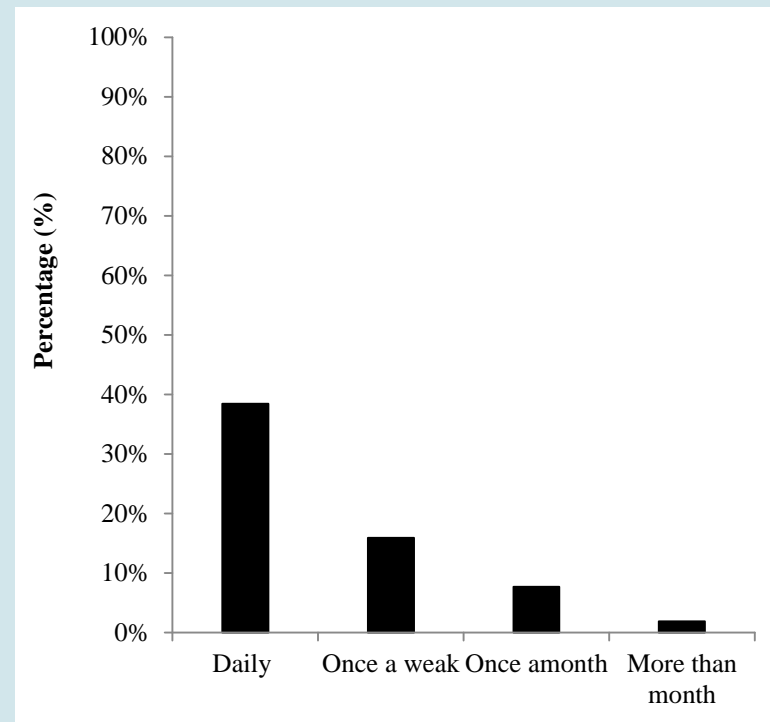


Fig 9 Frequency of Probiotics prescriptions

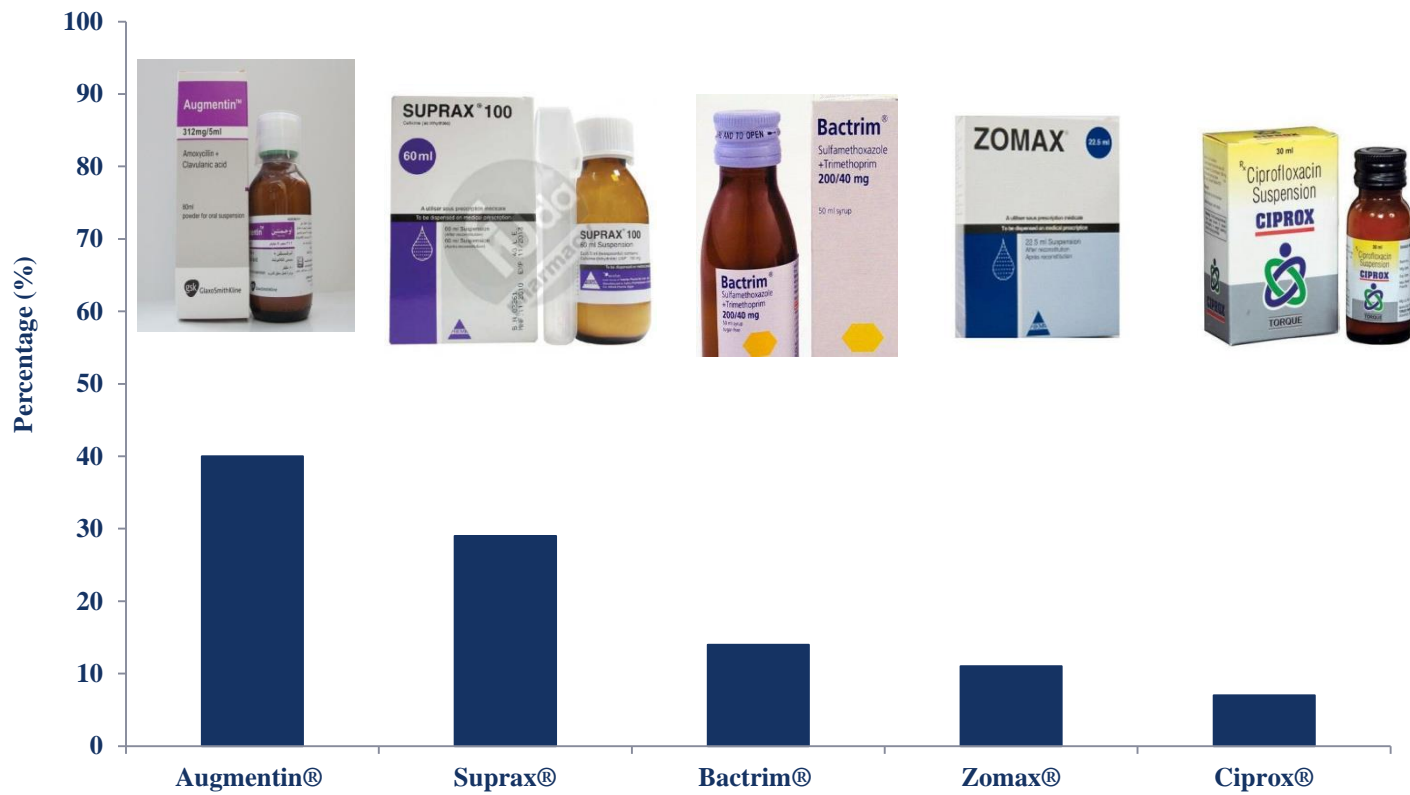


Fig 10 Other co-prescribed antibiotics

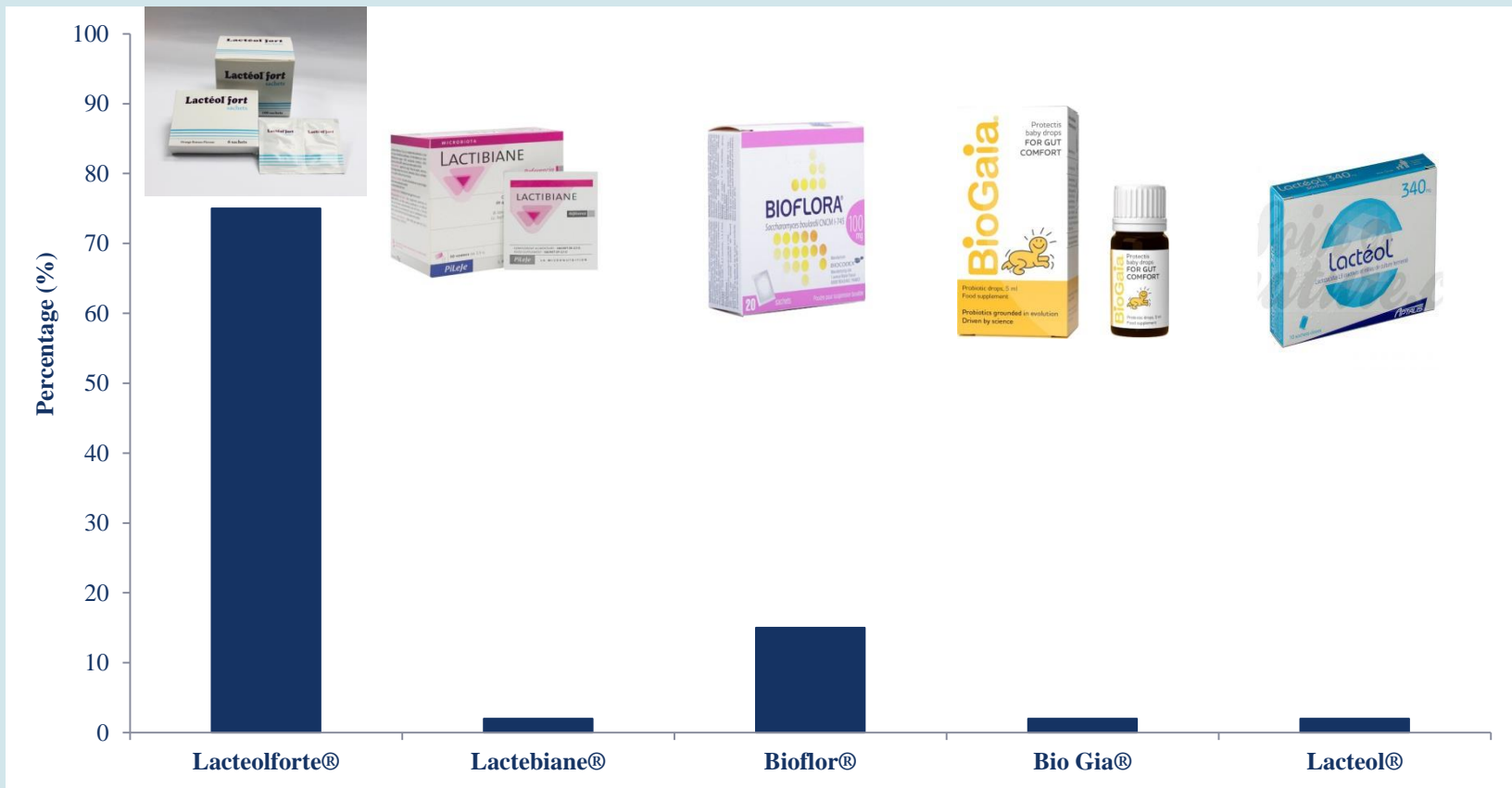


Fig 11 Probiotic strains co-prescribed with antibiotics

FINDINGS OF META-ANALYSIS

- Mostly used probiotics (*Lactobacillus*, *Bifido* bacteria and *Saccharomyces*).
- Mostly co prescribed antibiotics (Flagyl and Augmentin).
- Regarding antibiotics and probiotics Co prescribing there are evidences that antibiotics damages the gut bacteria.^(1 & 2)
- Administration of probiotics will lead to effectively colonization of the gut, but this colonization delay the normal recovery of microbiota for about 6 months.⁽³⁾

1.

References ...

Shifting the balance: antibiotic effects on host–microbiota mutualism

Benjamin P. Willing^{*§}, Shannon L. Russell^{*§} and B. Brett Finlay^{*§}

Abstract | Antibiotics have been used effectively as a means to treat bacterial infections in humans and animals for over half a century. However, through their use, lasting alterations are being made to a mutualistic relationship that has taken millennia to evolve: the relationship between the host and its microbiota. Host–microbiota interactions are dynamic; therefore, changes in the microbiota as a consequence of antibiotic treatment can result in the dysregulation of host immune homeostasis and an increased susceptibility to disease. A better understanding of both the changes in the microbiota as a result of antibiotic treatment and the consequential changes in host immune homeostasis is imperative, so that these effects can be mitigated.

2.

Langdon et al. *Genome Medicine* (2016) 8:29
DOI 10.1186/s13073-016-0294-z

Genome Medicine

REVIEW

Open Access



The effects of antibiotics on the microbiome throughout development and alternative approaches for therapeutic modulation

Amy Langdon^{1,2†}, Nathan Crook^{1,2†} and Gautam Dantas^{1,2,4,*}

3.



International Journal of
*Environmental Research
and Public Health*



Review

Rebuilding the Gut Microbiota Ecosystem

Antonella Gagliardi, Valentina Totino, Fatima Cacciotti, Valerio Iebba, Bruna Neroni, Giulia Bonfiglio, Maria Trancassini, Claudio Passariello , Fabrizio Pantanella and Serena Schippa *

Department of Public Health and Infectious Diseases, Section of Microbiology, Sapienza University of Rome, Rome 00185, Italy; antonella.gagliardi@uniroma1.it (A.G.); valentina.totino@uniroma1.it (V.T.); cacciotti.fatima@gmail.com (F.C.); valerio.iebba@uniroma1.it (V.I.); bruna.neroni@uniroma1.it (B.N.); giulia.bonfiglio@gmail.com (G.B.); maria.trancassini@uniroma1.it (M.T.); claudio.passariello@uniroma1.it (C.P.); fabrizio.pantanella@uniroma1.it (F.P.)

* Correspondence: serena.schippa@uniroma1.it; Tel.: +39-339-115-2753

FINDINGS OF META-ANALYSIS CONT.

- In the absence of probiotics the microbiota returns to normal within **3 weeks** of discontinuing the antibiotics intake. (1 & 2)

- **Reference**

1.

OPEN ACCESS Freely available online

PLOS ONE

Short-Term Effect of Antibiotics on Human Gut Microbiota



Suchita Panda¹, Ismail El khader¹, Francesc Casellas^{1,2}, Josefa López Vivancos³, Montserrat García Cors³, Alba Santiago¹, Silvia Cuenca¹, Francisco Guarner^{1,2}, Chaysavanh Manichanh^{1,2*}

¹ Digestive System Research Unit, Vall d'Hebron Research Institute, Barcelona, Spain, ² Centro de Investigación Biomédica en Red en el Área temática de Enfermedades Hepáticas y Digestivas (CIBERehd), Instituto de Salud Carlos III, Madrid, Spain, ³ Internal Medicine Department, Capio Hospital General de Catalunya, Universitat Internacional de Catalunya, Barcelona, Spain

2. **Mucosal immunity to pathogenic intestinal bacteria.** Araceli Perez-Lopez, Judith Behnsen, Sean-Paul Nuccio & Manuela Raffatellu. *Nature Reviews Immunology* volume 16, pages135–148 (2016)

FINDINGS OF META-ANALYSIS ... CONT.

- Conversely investigations showed that taking probiotics can **significantly decrease the incidence of antibiotics associated Diarrhea by about 50%**. (3, 4 & 5)

- **Reference**

3. Doron SI, Hibberd PL, Gorbach SL. Probiotics for prevention of antibiotic-associated diarrhea. J Clin Gastroenterol. 2008 Jul; 42 Suppl 2:S58-63.

4.



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Cochrane Database of Systematic Reviews

[Intervention Review]

Probiotics for the prevention of pediatric antibiotic-associated diarrhea

Joshua Z Goldenberg¹, Lyubov Lytvyn², Justin Steurich³, Patricia Parkin⁴, Sanjay Mahant⁴, Bradley C Johnston⁵

¹Bastyr University Research Institute, Seattle, WA, USA. ²Department of Clinical Epidemiology and Biostatistics, McMaster University, Hamilton, Canada. ³Bastyr University, Seattle, WA, USA. ⁴Child Health Evaluative Sciences, Hospital for Sick Children Research Institute, Toronto, Canada. ⁵Systematic Overviews through advancing Research Technology (SORT), Child Health Evaluative Sciences, The Hospital for Sick Children, University of Toronto, Toronto, Canada

5.



antibiotics



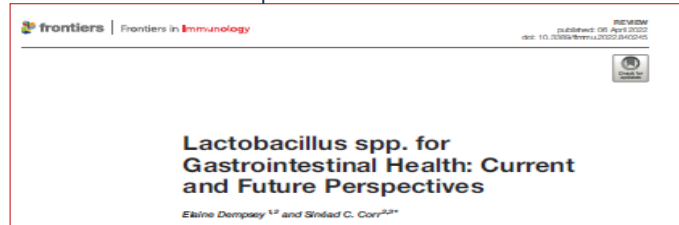
Review

Probiotics for the Prevention of Antibiotic-Associated Diarrhea in Outpatients—A Systematic Review and Meta-Analysis

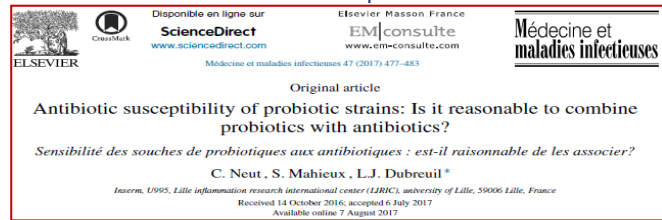
Sara Blaabjerg *, Daniel Maribo Artzi * and Rune Aabenhus *

FINDINGS OF META-ANALYSIS CONT.

According to studies obtained, *Lactobacillus* was strongly recommended by Europe Society for Pediatric Gastroenterology Herpetology and Nutrition (ESPGHAN)



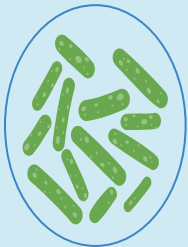
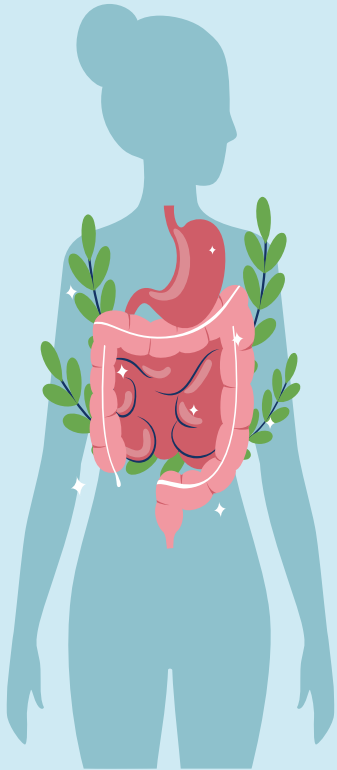
Sacchromyces boulardii is of interest and can be co-prescribed with oral antibiotics without being affected



Lactobacillus had good inhibitory effect against *E. coli* which produces lactic acid and other organic acids reducing intestinal pH as well as various metabolites to prevent the growth of many pathogenic bacteria

studies show that co administration of probiotics and antibiotic can help reduce the unwanted effects of gastric disorders like diarrhoea and candida infection

PROBIOTICS & ANTIBIOTICS



05

DISCUSSION



DISCUSSION

- Most of pharmacists are not Familiar with probiotics (up to 90%), with mistake of confusion with oral rehydration salts (ORS).
- Probiotics as POM always prescribed with antibiotics, in most cases Flagyl.
- Probiotics mostly prescribed for kids <5 years old.
- No complications of probiotics use were reported.
- There are daily prescriptions contain probiotics dispensed.
- There is solo prescription of probiotics among pharmacies included in the study.

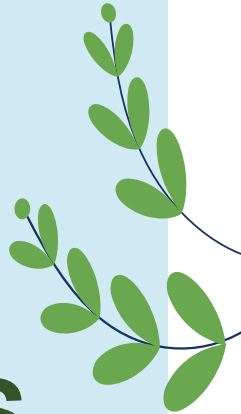
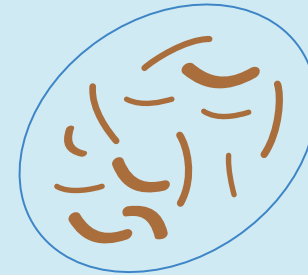
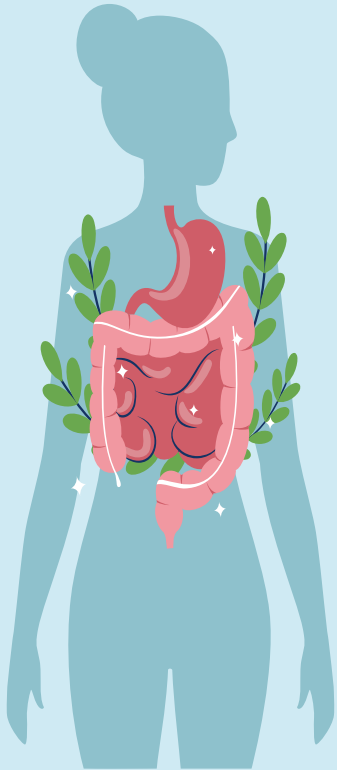
FROM META-ANALYSIS CAN BE CONCLUDED THAT

- The microbial community for each one of us is individual, means that there's no similarity in our sort of health benefit or illness related.
- **Which Probiotic is the best to be used ?**
- **We don't know**, because it will depends on each individual unique microbiota of the gut also depends on (age, comorbidities and duration of sickness).
- Probiotics commonly recommended are (Lactobacillus and Sacchromyces). Not because these 2 Probiotics are the best but the reason that they have the most evidence for promoting a beneficial effect (extensively studied).

ACCORDING TO EXPERTS ADVICE

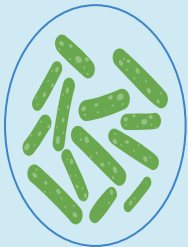
- They are against taking antibiotics and probiotics at the same time, so if patient taking antibiotic in the morning it's recommended to have probiotic at the night.
- **Concomitant intake** leads to that while probiotic trying to colonize the gut, antibiotic will kill them.
- Clinicians and dietitians recommend that the probiotics should be taken at least 1 to 2 weeks after completion of the antibiotic course.

PROBIOTICS & ANTIBIOTICS



06

RECOMENDATIONS



ACCORDING TO EXPERTS ADVICE

According to the questionnaire results we strongly recommend:

- Giving **awareness** lectures about **probiotics** and **their health benefits** targeting all health professionals in Libya as we noticed a lack of familiarity, understanding, and occasionally confusion about its mode of action.
- We **hope** to start **adding** this **topic** in medical faculties (Medicine, Pharmacy and Dentistry) programs of study due to its benefits to our health.



THANKS!

Do you have any
questions?

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