INTRODUCTION

Symbiotic are synthetic food products that contain both probiotics and prebiotics (Gibson and Roberfroid., 1995). The main role of this combination is to maintain a healthy intestinal microbiota (Rioux et al., 2005). Probiotics are living microorganisms that, when ingested in adequate quantity, have beneficial effects on health (Hill et al., 2014). Among the microorganisms most commonly used as probiotics are: Lactobacillus and Bifidobacterium, some species of E.coli and Bacillus and the yeast Saccharomyces cerevisiae (Kim et al., 2019; Zawistowska-Rojek and Tyski., 2018). Probiotics must be neither toxic nor pathogenic, and must resist gastric, biliary and pancreatic secretions to remain alive in the small intestine and colon (Doron and Snydman., 2015). Several studies suggest that probiotics play important roles in human health, such as regulating the immune response, rebalancing the intestinal flora and preventing certain diseases and cancer (Markowiai and Śliżewska., 2017). Prebiotics are defined as non-digestible substances capable of exerting multiple positive virtues in humans, they stimulate the growth and activity of certain microbial species (Gibson and Roberfroid., 1995). The best-known are: inulin, oligofructose, galacto-oligosaccharides, lactulose (Fan et al., 2016; Vandenplas et al., 2015; Closa-Monasterolo et al., 2013).

Trends in the Use of Symbiotics in Morocco During the Years 2020 and 2021

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ABSTRACT

Several studies have highlighted the importance of these 3 concepts, which are probiotics, prebiotics and symbiotic in daily clinical practice. They play an important role in the treatment/prevention of several diseases and contribute to the proper functioning of the digestive and immune systems. The objective of our study is to describe and compare the evolution of the use of symbiotic by the Moroccan population based on the sales rate between the year 2020 and 2021. Data collection was carried out by a means of a questionnaire concerning 15 symbiotic products most used by the Moroccan population. Our study suggests that some products have seen an increase in sales between 2020 and 2021, such as Lactobaciluscasei which reached 95,500 products in 2021 instead of 69,500 products in 2020, while the sale of the products decreased such as Bifidobacterium longum which reached 0 products in 2021 instead of 300 products in 2020, and according to the student test there is a significant difference between the average sales during the two successive years of 2020 and 2021 (p = 0,037). Our results show that the consumption and the use of symbiotic products by Moroccan population have shown significant differences.

Keywords: symbiotic, prebiotics, probiotics, sales, Moroccan population.
In addition, probiotic-prebiotic couples are currently being tested. For example, the case for the combination of Bifidobacteria/fructo-oligosaccharides, Lactobacilli/Lactilol or Bifidobacteria/galacto-oligosachcharides.

Our work consists to describe the evolution of the use of symbiotic by the Moroccan population during two successive years 2020 and 2021 based on the growth rate of sales of these products.

**MATERIAL AND METHOD**

**Data collection**

This cross-sectional study was based on several types of symbiotic products. The data concerned the increase in sales throughout the Moroccan territory during the two consecutive years 2020 and 2021. Data collection was based on a questionnaire distributed by IMS (information management system) and completed by the marketing authorization holder in Morocco territory (Table 1).

**Statistical analysis**

The mean comparison between the sales of the symbiotic was evaluated by the Student test t. Any association with p <0.05 was considered significant. The data analysis was entered and performed using the Statistical Package for the Social Science (SPSS) (software version 22.0).

**RESULTS**

**The evolution of sales of symbiotic products during 2020 and 2021**

According to the results obtained in Figure 1, we observed an increase in the sales of products P1 (Corn starch, capsule shell...), P2 (fructooligosacharide...), P3 (Lactobacillus casei...), P4 (Fiber...), P5 (Bifidobacterium lactis...), P6 (Rhubarb...), P8 (Ocidilactici...), P9 (Lactobacillus rhamnosus...), P12 (Cellulose...), on the other hand, a decrease in the sales of products P7 (Bifidobacterium longum...), P10 (Lactobacillus helveticus...), and lack in the sales of products P11 (Vitamin D...), P13 (Bulking agent...), P14 (Citral...), P15 (1g of active substance contains: Enterococcus faecium – 300 mg...).

**The relationship between the sales of symbiotic in the years 2020 and 2021**

According to the student test t, the results show that there is a significant difference between averages of sales during the 2 successive years of 2020 and 2021 with p = 0.037 (Table 2).

**The rate of change in sales between 2021 and 2022 (thousands of Dirhams)**

The percentage variation in sales between 2020 and 2021 is shown in Figure 2. We observed that P5 was predominant with 88% of the overall products, followed by P5 with 85% and P12 with 65%. Inversely, P11, P13, P14, P15 presented 0% of the overall market.

**DISCUSSION**

The oral consumption of microorganisms as beneficial agents for human health has fascinated humanity for many centuries. The concept of probiotics was defined in the first time by Ferdinand Vergin in 1954 (Markowiak and Śliżewska., 2017). Products containing probiotics have recently known a great commercial success in Europe, in Asia and in other parts of the world. This progress will stimulate the consumption and development of the product.

The results of the study showed that there is a difference in sales between the symbiotic products. Some products have seen an increase in sales between 2020 and 2021, as Lactobacillus casei which reached 95,500 products in 2021 instead of 69,500 products in 2020, while the sale of the products decreased such as Bifidobacterium longum which reached 0 products in 2021 instead of 300 products in 2020, and the major rate in the market is occupied by Bifidobacterium lactis with a sale rate reaching 88% of total sales in the Moroccan product.

The European population consumes probiotics in food and in food supplements. The consumer market for probiotic products is worth >1,4 billion euros in Western Europe (Saxelin., 2008). The consumption of yoghurts and desserts is the most important, which sales of 1 billion euros. Thus, the food supplements have an estimated activity of 10% of total probiotic market.

A study in the Japan revealed that the sale of probiotic products has grown exponentially, US$5.3 billion in 2005 instead $1.12 billion in...
<table>
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<tr>
<th>Trade name</th>
<th>Symbol of symbiotic in the study</th>
<th>Date of initial sales in the Moroccan market</th>
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<td>Corn starch; capsule shell: hydroxypropylmethylcellulose; bacterial strain Bifidobacterium infantis (strain 35624®); anti-caking agents: magnesium salts of fatty acids, magnesium stearate of fatty acids; saccharose, trehalose*; stabilizing agent: sodium citrate fructooligosacharides 958.2 mg/sachet + Lactobacillus casei (PXN® 37TM) ; Lactobacillus rhamnosus PXN® 54TM; Streptococcus thermophylus PXN® 66TM ; Lactobacillus acidophilus PXN® 35TM; Bifidobacterium breve PXN® 25TM ; Bifidobacterium infantis PXN® 27TM; Lactobacillus bulgaricus PXN® 39TM Saccharomyces boulardii 282.5 mg per sachet Fiber (fructooligocarharides 25.4 mg), inulin (25.4 mg), Lactobacillus helveticus Rosell-52, Lactobacillus helveticus Laff® L10, Lactobacillus rhamnosus Rosell-11, Bifidobacterium longum Rosell-175. vitamin D3 (0.75 µg). Bifidobacterium lactis, Bifidobacterium bifidum, Bifidobacterium infantis, Bifidobacterium breve, Lactobacillus acidophilic, Lactococcus lactis, Strepococcus thermophylus, Lactobacillus helveticus, Lactobacillus rhamnosus, Lactobacillus salivarius, Lactobacillus lactis Streptococcus thermophylus, Saccharomyces boulardii, Bacillus coagulans, fructo-oligosaccharides (Actilight), inulin, corn maltodextrin (bulking agent), hydroxymethylcellulose (coating agent), magnesium stearate, silicon oxide (anti-caking agent), gelan gum (thickener). Bifidobacterium longum LA101 Lactobacillus helveticus LA102 Lactococcus lactis LA103 Streptococcus thermophylus LA104 Lactobacillus plantarum CECT 7484, Lactobacillus plantarum CECT 7485, Pediococcus acidilactic CECT 7483, Excipients: maltodextrin, silicon dioxide, magnesium stearate, hydroxypropyl methylcellulose, titanium dioxide. Lactobacillus rhamnosus GG Bifidobacterium lactis + Tormentil root Excipients: maltodextrin, hypromellose (capsule); microcrystalline cellulose; titanium dioxide (colorant) ; magnesium stearate(anticoagulating agent). Bifidobacterium longum LA101, Lactobacillus helveticus LA102, Lactococcus lactis LA103, Streptococcus thermophylus LA104, Lactobacillus Rhamnosus LA801, Vitamine D Lactobacillus rhamnosus R0011 Lactobacillus helveticus R0052, Vitamine D Bulking agent: cellulose; Lactobacillus acidophilus, Lactobacillus plantarum, Bifidobacterium lactis, Bifidobacterium breve; anti-caking agent: magnesium salts of fatty acids. sweetener (xyitol), Lactobacillus reuteri DSM 17938; Lactobacillus reuteri Protectis, vitamin D3 20 µg + flavor enhancer: citric acid. Lactobacillus fermentum; Lactobacillus delbrueckii. *Fermented culture Lactose monohydrate, casein peptone, yeast extract, sodium acetate trihydrate, dipotassium phosphate anhydrous. *Excipients: hydrated colloidal silica, talc, magnesium stearate, anhydrous lactose. *Lyophilization adjuvants: lactose monohydrate, calcium carbonate. *colorant (capsule): titanium dioxide Lactobacillus acidophilus (DSM 13241); Bifidobacterium animalis subsp. lactis (DSM 15954), + Oligofructose, * bulking agent: cellulose, potato starch, * humectant: fatty acids.</td>
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According to the report revealed by WHO and FAO in November 2018, the global market for probiotic ingredients was valued $1.5 billion in 2016 and is expected to reach $2.15 billion by 2021 (Bornes., 2020). In the same sense, a market research report on probiotics in France for the period of October 2018 to September 2019 revealed that sales of probiotic products increased from about 54 million euros in the period of October 2017 to September 2018 to about 60 million euros in the period of October 2018 to September 2019. That is an increase of about 11% in just 1 year (Bornes., 2020).

**CONCLUSION**

The consumption and the use of symbiotic by the Moroccan population have shown significant differences. It is necessary to concentrate the efforts between all the institutions for the sensitization and the awareness by the population on the benefits of probiotics, the consideration of the socio-economic criteria of the person and the facilitation of the conditions of importation and the marketing of the products.

**REFERENCES**


