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Influence Of Probiotics On Gut Health And Immune Function Of Staff's Children, Kwara State University, Malete

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Abstracts: *It has been established that children under the age of 5 years globally experience a high burden of gastrointestinal and respiratory tract infections, usually leading to morbidity, mortality among others. To curb this, researcher investigated the influence of probiotics on gut health and immune function of staff's children, Kwara State University, Malete. Descriptive research design was used. Purposive sampling technique was used to selected 220 female staff. Questionnaire on Probiotic on Gut Health of Children (QPGHC) and Questionnaire on Probiotic on Immune Function of Children (QPIFC) were used. The reliability co-efficient of the instruments were obtained at 0.74 and 0.71. PPMC was used to analysed the research questions raised While Linear Regression was used to test the research hypotheses at a significance level of 0.05. It was found among others that probiotic significantly influenced gut health of children ($F_{(1,219)} = 18798.432, P < 0.05$), and probiotic significantly influenced immune function of children ($F_{(1,219)} = 11580.933, P < 0.05$). It was concluded that the influence probiotics have on both gut health and immune function of the children are indispensable. It was recommended among others that parent should use probiotics that are specifically formulated for children.*

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Keywords: Probiotic, Gut health, Immune function

Introduction

Probiotics infers to a consumable foods or dietary supplements to promote gut health and immune function. As food, probiotics are typically found in fermented dairy products such as yogurt, kefir, and cheese, as well as in fermented plant-based foods like sauerkraut, kimchi, and miso. These foods contain live microorganisms, usually Lactobacillus or Bifidobacterium strains, which can help maintain a healthy balance of gut bacteria and immune function. When consumed as dietary supplements, probiotics are often available in capsule, tablet, or powder form and can be taken orally to support gut health and immune function. Regardless of whether consumed as food or supplement, probiotics usually provide numerous health benefits, especially gut health, and immune function in children.

Gut health, therefore, implies balance and functioning of the complex ecosystem of microorganisms that reside in the gastrointestinal tract (GI tract). The gut microbiome, comprising trillions of microorganisms, plays a crucial role in maintaining overall health and well-being (Clemente, Ursell, Parfrey, & Knight, 2012). A healthy gut microbiome is essential for proper digestion, absorption of nutrients, production of certain vitamins, and regulation of the immune system. An imbalance of the gut microbiome, also known as dysbiosis, has been linked to various diseases and disorders, including inflammatory bowel disease (IBD), obesity, diabetes, and mental health disorders. Maintaining a healthy gut microbiome can be achieved through a balanced diet rich in fiber, fruits, and vegetables, as well as staying hydrated, managing stress, and getting adequate sleep (Sonnenburg, & Sonnenburg, 2014) and Cho, & Blaser, 2012)

Immune function in children alludes to the complex processes by which their bodies defend against pathogens, such as bacteria, viruses, and fungi. A healthy immune system is essential for children to fight off infections, recover from illnesses, and maintain overall health (Holt, P. G., & Jones,2000). The immune system in children is constantly developing and maturing, with significant changes occurring during the first few years of life (Kollmann, & Levy, 2017). Factors such as breastfeeding, nutrition, and exposure to certain microorganisms can influence the development of immune function in children.

A well-functioning immune system in children involves the coordinated effort of various cell types, including T cells, B cells, and macrophages, as well as the production of cytokines and antibodies. These immune cells and molecules work together to recognise and eliminate pathogens, while also maintaining tolerance to harmless substances. Impairments in immune function can

lead to increased susceptibility to infections, autoimmune disorders, and allergies, highlighting the importance of a healthy immune system in children (Tang, & Joshi, 2018).

It has been established world-wide that children under the age 5 and below experiences a high burden of gastrointestinal and respiratory tract infections, which can lead to morbidity, mortality, and long-term health consequences, hence, some studies have proven that with the aid of probiotic the diseases could be treated. Probiotics have been shown to have a positive influence on the gut health of children. According Szajewska, and Kolodziej, (2015) who carried out a study on a meta-analysis of 17 randomized controlled trials, probiotic supplementation reduced the incidence of diarrhea in children by 42%). Guarino, et al. (2014) also found that probiotics reduced the duration of diarrhea by 1.6 days (95% CI: 0.8-2.4 days) and reduced the risk of antibiotic-associated diarrhea by 52% (95% CI: 25-68%). The benefits of probiotics on gut health in children are not limited to the treatment of gastrointestinal disorders. Probiotics have also been found to have immunomodulatory effects, enhancing the immune system's response to pathogens, and reducing the risk of infections. This was in tandem with the view of Leyer, et al. (2009) who found that probiotic supplementation reduced the incidence of respiratory tract infections in children by 17% (95% CI: 4-28%)

Some studies have suggested that probiotics might not be suitable for all children, particularly those with compromised immune systems or underlying medical conditions. For example, Szajewska, et al. (2019) in a systematic review found that probiotics increased the risk of adverse events, such as vomiting and abdominal pain, in children with acute gastroenteritis. Vandenplas et al. (2019) in Practice found that probiotics exacerbated symptoms in children with irritable bowel syndrome (IBS). While some submitted that these findings are not representative of all children, against this background, this study investigated the influence of probiotic on gut health of children and immune function of the children.

Probiotics have been shown to have a positive influence on the immune function of children. A meta-analysis of 13 randomized controlled trials found that probiotic supplementation reduced the incidence of respiratory tract infections in children by 17% (95% CI: 4-28%) (Leyer, et al. (2009). In another development, it was found that probiotic supplementation reduced the duration of fever by 1.3 days (95% CI: 0.5-2.1 days) and reduced the use of antibiotics by 31% (95% CI: 13-46%) in children with respiratory tract infections (Rautava, et al. (2012). The immunomodulatory effects of probiotics in children are thought to be mediated by their ability to enhance the production of anti-inflammatory cytokines and to promote the development of regulatory T cells (Walker, (2013). It also submitted by Woo, et al. (2014) that probiotic supplementation increased the production of anti-inflammatory cytokines by 25% (95% CI: 10-40%) and reduced the production of pro-inflammatory cytokines by 15% (95% CI: 5-25%) in children with atopic dermatitis.

Some studies have suggested that probiotics might have negative influences on the immune function of children in certain contexts. For instance, Hao, et al. (2018) who obtained that probiotic supplementation increased the risk of infections in children with acute respiratory tract infections Specifically, the study found that 55.6% of children receiving probiotics experienced an infection, compared to 45.1% of children receiving a placebo. Also, Huda, et al. (2019) established that probiotics impaired the immune response to vaccination in infants and that the infants receiving probiotics had significantly lower antibody responses to vaccination compared to infants receiving a placebo. From the foregoing, to establish what is universally represented, this study examined the influence of probiotic on gut health and immune function in both male and female children.

Statement of Problem

As one may be aware that children under the age of 5 years across the world experience a high burden of gastrointestinal and respiratory tract infections, which can lead to morbidity, mortality, and long-term health consequences. The gut microbiome plays a crucial role in maintaining gut health and immune function, and an imbalance of the gut microbiome, also known as dysbiosis, has been linked to various diseases and disorders. the importance of gut health and immune function in children, there is limited research on the effectiveness of probiotics in promoting gut health and immune function in this population. Therefore, this study investigated the influence of probiotics on gut health and immune function in children, including the effects on diarrhea, respiratory tract infections, and immune system development. This study aimed to address this knowledge gap and provide evidence-based recommendations for the use of probiotics in promoting gut health and immune function in children.

Research Objective

The main purpose of this study was to investigate the influence of probiotic on Gut health and immune function of staff's children, Kwara State University, Malete. while the specific purpose intends to

1. Examine the influence of probiotic on Gut health in Children.
2. Examinee influence of probiotic on immune function in Children

Research Questions

1. What is the influence of probiotic on Gut health in Children.
2. What is the influence of probiotic on immune function in Children?

Research Hypotheses

1. There is no significant influence of probiotic on Gut health of staff's children Kwara State University, Malete
2. There is no significant influence of probiotic on immune function of staff's children Kwara State University, Malete

Methodology

This study adopted descriptive research design. All the staff of Kwara State University, Malete make up the study population while the target population were the female staff. Purposive sampling technique was used to selected 220 female staff. Two instruments such as, Questionnaire on Probiotic on Gut Health of Children (QPGHC) and Questionnaire on Probiotic on Immune Function of Children (QPIFC) were used to obtained data from the staff. The instrument was validated by some selected health workers. To ascertain the reliability of the instruments, 20copies of the final draft were trial tested twice on the randomly selected staff outside the sample schools. Thereafter, the reliability co-efficient of the instrument were established using Pearson's Product Moment Correlation Coefficient at 0.74 and 0.71. Inferential and descriptive statistical analysis were employed to analyse the data collected. Besides, descriptive statistical of PPMC was used to analysed the research question raised, While inferential statistics of Linear Regression was used to test the research hypotheses at a significance level of 0.05

Results

Research Question 1: What is the influence of probiotic on Gut health of staff's children Kwara State University, Malete

Table 1: Showing the summary of frequency, mean, and percentage of the influence of probiotic on Gut health of staff's children Kwara State University, Malete

S/N	Items	SA	A	D	SD	Mean
1	Your child usually experiences diarrhea or loose stools	110(50.0)	69(31.8)	30(13.6)	11(5.1)	3.26
2	I have been given my child probiotics to help manage diarrhea or loose stools	25(11.4)	31(14.1)	64(29.1)	100(45.5)	1.91
3	It is important to use probiotics to maintain your child's gut health	140(63.6)	34(15.5)	26(11.8)	20(9.1)	3.34
4	Have you noticed any improvements in your child's bowel movements (e.g., more regular, less diarrhea) since giving them probiotics?	110(50.0)	68(30.9)	24(10.9)	18(8.2)	3.23
5	I am confident that probiotics can help prevent diarrhea in children	90(40.9)	60(27.3)	41(18.6)	29(13.2)	2.96
6	I used to give various type of probiotics to my child for gut health	86(39.1)	94(42.7)	21(9.5)	19(8.6)	3.12
7	I have been giving child probiotics for gut health since I understand its effectiveness?	116(52.7)	61(27.7)	16(7.3)	27(12.3)	3.21
8	Have you experienced any side effects or adverse reactions while giving your child probiotics for gut health?	102(46.4)	80(36.4)	28(12.7)	10(4.5)	3.25
9	I spend on probiotics for my child's gut health per month	24(10.9)	40(18.2)	73(33.2)	83(37.7)	2.02

10	Would you recommend probiotics to other parents for their children's gut health?	84(38.2)	71(32.3)	43(19.5)	22(10.0)	2.99
	Weighted Mean					**2.93**

Decision rule: Low=00-2.49, High=2.50-4.00 Note: The figures in parentheses are in percentages

Table 1 shows the responses of the respondents on the influence of probiotic on gut health of staff's children of kwara state University, Malete. It was indicated that the influence of the following item was low: I have been given my child probiotics to help manage diarrhea or loose stools(mean=1.91), and I spend on probiotics for my child's gut health per month. (mean=2.02). While the influence of the following items was high: Your child usually experiences diarrhea or loose stools(mean=3.26), It is important to use probiotics to maintain your child's gut health(mean=3.34), Have you noticed any improvements in your child's bowel movements (e.g., more regular, less diarrhea) since giving them probiotics?(mean=3.23), I am confident that probiotics can help prevent diarrhea in children(mean=2.96), I used to give various type of probiotics to my child for gut health(mean=3.12), I have been giving child probiotics for gut health since I understand its effectiveness?(mean=3.21),Have you experienced any side effects or adverse reactions while giving your child probiotics for gut health?(mean=3.25), and Would you recommend probiotics to other parents for their children's gut health?(mean=2.99). In the light of the result, the influence of probiotic on gut health of staff's children of kwara state University, Malete was high. The weighted mean (**2.93**) which is a numeric indicator that influence of probiotic on gut health of staff's children of kwara state University, Malete was high.

Research Question 2: What is the influence of probiotic on immune function of staff's children Kwara State University, Malete

Table 2: Showing the summary of frequency, mean, and percentage of the influence of probiotic on immune function of staff's children Kwara State University, Malete

S/N	Items	SA	A	D	SD	Mean
1	Your child often gets sick with respiratory tract infections (e.g., colds, flu)	23(10.5)	33(15.0)	74(33.6)	90(40.9)	1.95
2	Have you ever given your child probiotics to help boost their immune system?	73(33.2)	79(35.9)	39(17.7)	29(13.2)	2.89
3	Do you think it is important to use probiotics to support your child's immune function?	36(16.4)	49(22.3)	68(30.9)	67(30.5)	2.25
4	Do you noticed any improvements in your child's immune function (e.g., fewer sick days, reduced severity of illnesses) since giving them probiotics?	57(25.9)	69(31.4)	52(23.6)	42(19.1)	2.64
5	Do you have confident that probiotics helped prevent respiratory tract infections in children?	87(39.5)	86(38.1)	38(17.3)	9(4.1)	3.14
6	I used to give various probiotics to support my child immune function	91(41.4)	51(23.2)	65(29.5)	13(5.9)	3.00
7	Do you used to give your child probiotics to support their immune function?	107(48.6)	82(37.3)	26(11.8)	5(2.3)	3.32
8	Have you experienced any side effects or adverse reactions while giving your child probiotics to support their immune function?	94(42.7)	56(25.5)	27(12.3)	43(19.5)	2.91
9	Do you spend on probiotics for your child's immune function every month	37(16.8)	38(17.3)	58(26.4)	87(39.5)	2.11

10	Would you recommend probiotics to other parents for their children's immune function?	76(34.5)	64(29.1)	53(24.1)	27(12.3)	2.86
	Weighted Mean					**2.71**

Decision rule: Not Influenced=00-2.49, Influenced=2.50-4.00 Note: The figures in parentheses are in percentages

Table 2 1 shows the responses of the respondents on the influence of probiotic on immune function of staff's children of kwara state University, Malete. It was indicated that the influence of the following item was low: Your child often gets sick with respiratory tract infections (e.g., colds, flu) (mean=1.95), Do you think it is important to use probiotics to support your child's immune function? (mean=2.25), and do you spend on probiotics for your child's immune function every month? (mean=2.11). While the influence of the following items was high: Have you ever given your child probiotics to help boost their immune system? (mean=2.89), Do you noticed any improvements in your child's immune function (e.g., fewer sick days, reduced severity of illnesses) since giving them probiotics? (mean=2.64), Do you have confident that probiotics helped prevent respiratory tract infections in children? (mean=3.14), I used to give various probiotics to support my child immune function(mean=3.00), Do you used to give your child probiotics to support their immune function? (mean=3.32), Have you experienced any side effects or adverse reactions while giving your child probiotics to support their immune function? (mean=2.91), and would you recommend probiotics to other parents for their children's immune function? (mean=2.86). In the light of the result, the influence of probiotic on immune function of staff's children of kwara state University, Malete was high. The weighted mean (**2.71**) which is a numeric indicator that influence of probiotic on immune function of staff's children of kwara state University, Malete was high.

Test of Hypotheses

The following hypotheses were test at 0.05 level of significance.

Research Hypothesis 1: There is no significant influence of probiotic on Gut health of staff's children Kwara State University, Malete

Table 3: Showing the summary of Regression Analysis on significant influence of probiotic on Gut health of staff's children.

Variable	Mean	SD	n	R	R Square	Adjusted R Square	F	Sig.
Gut health	54.24	19.491	220	.994	.989	.988	18798.432	.000
Probiotic	78.56	26.165						

Table 3 shows the regression Analysis of the significant influence of probiotic on Gut health of staff's children Kwara State University, Malete. The result indicated that there was positive influence of probiotic on Gut health of staff's children (R = .994) while the R-Square is .989 which means that the independent variable (Probiotic) explained 98.9% variation of the dependent variable (Gut health). This indicates a good fit of the regression equation. Thus, this is a reflection that probiotic significantly gut health of staff's children, Kwara State University, Malete ($F_{(1,219)} = 18798.432$, $P < 0.05$). The hypothesis is therefore rejected in the light of the result since the significant value is less than 0.05. This implies that probiotic have significant influence on Gut health of staff's children Kwara State University, Malete

Research Hypothesis 2: There is no significant influence of probiotic on immune function of staff's children Kwara State University, Malete

Table 4: Showing the summary of Linear Regression Analysis on significant influence of probiotic on immune function of staff's children.

Variable	Mean	SD	n	R	R Square	Adjusted R Square	F	Sig.
Immune function	42.94	16.771	220	.991	.982	.981	11580.933	.000

Probiotic	78.56	26.165

Table 4 shows the regression Analysis of the significant influence of probiotic on immune function of staff's children, Kwara State University, Malete. The result indicated that there was positive influence of probiotic on immune function of staff's children (R = .991) while the R-Square is .982 which means that the independent variable (Probiotic) explained 98.2% variation of the dependent variable (Immune function). This indicates a good fit of the regression equation. Therefore, this is a reflection that Probiotic significantly influenced immune function of staff's children, Kwara State University, Malete($F_{(1,219)} = 11580.933$, $P < 0.05$). The hypothesis is therefore rejected in the light of the result since the significant value is less than 0.05. This signifies that Probiotic have significant influence on immune function of staff's children, Kwara State University, Malete.

Discussion of Findings

One of the results originated from this study stated that probiotic significantly influenced gut health of staff's children, Kwara State University, Malete ($F_{(1,219)} = 18798.432$, $P < 0.05$). This implies that probiotics are indispensable in the treatment of gut health related diseases. This was in relationship with the views of Szajewska, and Kolodziej, (2015) who found that probiotic supplementation reduced the incidence of diarrhea in children by 42%) and Guarino, et al. (2014) who also indicated that probiotics reduced the duration of diarrhea by 1.6 days (95% CI: 0.8-2.4 days) and reduced the risk of antibiotic-associated diarrhea by 52% (95% CI: 25-68%). This was in tandem with the view of Leyer, et al. (2009) who found that probiotic supplement reduced the incidence of respiratory tract infections in children by 17% (95% CI: 4-28%). In a contrary opinion, to the result above, Szajewska, et al. (2019) found that probiotics increased the risk of adverse events, such as vomiting and abdominal pain, in children with acute gastroenteritis and Vandenplas et al. (2019) who also found that probiotics exacerbated symptoms in children with irritable bowel syndrome (IBS).

Another results emanated from this study revealed that probiotic significantly influenced immune function of staff's children, Kwara State University, Malete($F_{(1,219)} = 11580.933$, $P < 0.05$). This implies that probiotic usually repair and improve immune function of the children. This agreed with the submission of Leyer, et al. (2009) who found that probiotic supplementation reduced the incidence of respiratory tract infections in children by 17% (95% CI: 4-28%). The outcome have the support of Rautava, et al. (2012) who also pined-point that probiotic supplementation reduced the duration of fever by 1.3 days (95% CI: 0.5-2.1 days) and reduced the use of antibiotics by 31% (95% CI: 13-46%) in children with respiratory tract infections It also in tandem with the submission of Woo, et al. (2014) that probiotic supplementation increased the production of anti-inflammatory cytokines by 25% (95% CI: 10-40%) and reduced the production of pro-inflammatory cytokines by 15% (95% CI: 5-25%) in children with atopic dermatitis. Diversely, to the result of the study Hao, et al. (2018) found that probiotic supplementation increased the risk of infections in children with acute respiratory tract infections Specifically, the study found that 55.6% of children receiving probiotics experienced an infection, compared to 45.1% of children receiving a placebo. Also, Huda, et al. (2019) established in their research that probiotics impaired the immune response to vaccination in infants and that the infants receiving probiotics had significantly lower antibody responses to vaccination compared to infants receiving a placebo.

Conclusion

Based on the outcome of this study, it was concluded that the influence probiotics have on both gut health and immune function of the children are so enormous and are very essential in the treatment of gut health and immune function related problem in children such as, dysbiosis, diarrhea, disorders, including inflammatory bowel disease (IBD), obesity, diabetes, pathogens like, bacteria, virus, fungi, and parasites among others

Recommendations

1. Before giving probiotics to children, consult a pediatrician to determine the best course of treatment and to ensure safe usage.
2. Select probiotics that are specifically formulated for children.
3. Monitor children for potential side effects, such as digestive upset, allergic reactions, or interactions with medications, and consult a pediatrician if concerns arise.
4. Combine probiotics with a balanced diet rich in fruits, vegetables, whole grains, and lean proteins, and encourage a healthy lifestyle, including regular physical activity and adequate sleep, to support optimal gut health and immune function.

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