RESEARCH PAPER

The Role of Gut Microbiota in Kidney Health and Disease

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ABSTRACT

Background: The gut microbiota has a significant role in ensuring the general health of a human being in terms of metabolic, immune, and the functionality of the organs. New studies have now shown the significance of the gastrointestinal gut-to-kidney axis, with the assumption that disruptions in gut microbiota can be the cause of kidney disease development and progression. It is important to know this relationship to be capable of coming up with preventive and therapeutic measures.

Objective: This research was intended to identify how gut microbiota impact gut and kidney health and disease during the quantification of the knowledge, awareness, dietary patterns, and perception associated with the gut-kidney relationship of the participants.

Methodology: A quantitative cross-sectional design was used. The data were gathered by administering a questionnaire to 189 respondents that consisted of a structured questionnaire that involved demographic variables, awareness of gut microbiota and gut-kidney axis knowledge, as well as lifestyle variables. The statistical analysis was done based on descriptive and inferential statistical techniques, such as a normality test, test of reliability and validity, t-test of independent samples, One-way ANOVA, Kruskal-Wallis test, Chi-square, and correlation as well as regression analysis.

Results: The observation showed that the data were normally distributed, and the questionnaire was of great reliability and fair validity. There had been significant differences and associations among demographic variables. The findings revealed that the relationships between knowledge, awareness, and dietary habits were positive and had a significant effect on preventive measures as far as kidney health was concerned. There was a greater awareness level among the participants who had kidney problems and those were Chronic Kidney Disease. The results of the regression analysis proved that preventive health behaviors are highly predicted by knowledge and awareness.

Conclusion: The paper comes to the conclusion that intestinal microbiota is an influential factor in kidney disease and health. Making people more aware, managing their diet, and maintaining a healthy lifestyle are the keys to the balanced microbiome of the gut and the prevention of complications with the kidneys. The results provide emphasis on the essence of educational interventions and the community health measures in ensuring kidney health.

Keywords: Gut Microbiota, Gut-Kidney Axis, Kidney Health, Chronic kidney disease, Dietary habits, Awareness, Prevention, Microbiome, Public Health

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Introduction

The human body is home to a highly diverse and complicated community of

microorganisms that is collectively referred to as the gut microbiota, which is essential in ensuring health in general. It is important to point out that a majority of microorganisms that are prevalent in the gastrointestinal tract are essential for the effectiveness of physiological activities such as digestion, metabolism, immune function, and the synthesis of nutritional values. More scientific literature in recent years indicates an important role of gut microbiota in more distant body organs, such as the kidneys, in what has since been dubbed the gutkidney axis (Praveenkumar Periyasamy1, 2024).

The gut-kidney axis is a bilateral association between intestinal microbiota and the kidney. Healthy kidneys, on the one hand, play a role in ensuring the presence of a balanced internal environment, which sustains normal microbial composition of the gut. On the other hand, alterations of gut microbiota, the so-called dysbiosis, can lead to the production of harmful metabolites, their unfavorable effect on the kidney. This communication has become an important research topic, especially in elucidating the process of development and progression of kidney diseases (Praveenkumar Periyasamy1*, 2024).

Production of uremic toxins is one of the most important mechanisms by which gut microbiota can modify or affect the kidney's work. Part of the compounds, such as indoxyl sulfate, p-cresyl sulfate, and trimethylamine N-oxide (TMAO), are broken down by some of the bacteria in the gut on the diet. The presence of the said toxins in the blood system leads to inflammation, oxidative stress, and further kidney damage in individuals who have poor kidney functioning. This causes a vicious cycle in which the malfunction of the kidneys exacerbates gut dysbiosis, and dysbiosis further degrades kidney disease (Likowsky Desir4 Hira Aslam1*, 2024).

One of the conditions that has been closely linked with kidney problems is Chronic kidney disease, which is also characterized by changes in gut microbiota. Gut microbial fauna of patients with CKD is typically frequently distorted in the sense that the number of beneficial bacteria and pathogenic species increases. The alterations are contributing to the augmentation of the intestinal permeability, also known as a “leaky gut, through which harmful materials can come into the bloodstream and induce systemic inflammation. This chronic inflammatory disease is important in intensifying the renal activity and facilitating the potential of cardiovascular issues (Tariq Rafique Praveenkumar Periyasamy1*, 2024).

The lifestyle and diet are other key factors in organizing gut microbiota and, as a result, kidney health, along with the processes of the disease. Fibrous diets enhance the development of protective bacteria that secrete short-chain fatty acids, which possess anti-inflammatory actions, whereas maintenance of gut barrier. On the other hand, consumption of processed foodstuffs and large intake of protein may foster the development of bacteria that produce toxins, thus making the body highly dependent on the kidneys. Therefore, dietary therapy, the use of probiotics, and prebiotics are recommended as some of the potential interventions that can be used to restore the microbial balance and improve the performance of the kidney (PERIYASAMY, 2024).

Even though recognition of the relationship between the gut kidney is growing, there is some ignorance regarding the relationship between the gut and the general population. The change in knowledge, awareness, and lifestyle is essential in the prevention of diseases, and to design a successful disease prevention program, one should know how the change of these variables affects gut microbiota and kidney health. Accordingly, the offered study will consider the role of the gut microbiota in promoting the well-being and illness of the kidney by analyzing the newfound knowledge and awareness, feeding habits, and perceptions of individuals around the gut-kidney axis. The obtained results of the research are supposed to be further included in the literature and serve to develop population-wide health programs aimed at improving the state of kidneys with the assistance of microbiota-specific interventions (Praveenkumar Periyasamy7 Abdullah Tariq1*, 2024).

Literature Review

The human gut microbiota is a great and actively changing community of microorganisms that is critical in ensuring physiological homeostasis. Over the past decade, the issue of the relation between the gut microbiota and other body diseases like kidney diseases has experienced growth. One of the recent emerging

areas of research has been suggested to be the gut-kidney axis, which shows the interdependent relationship between the kidney activity and the presence of intestine-dwelling microorganisms. This correlation is particularly important in the context of explaining the growth and further progression of kidney illnesses, and the determination of potential curative approaches as well (Kaleem Ullah Ihsan, 2026).

Gut microbiota has been associated with different functions of host health, which include the metabolism of different nutrients, immune modulation, and intestinal integrity maintenance. These positive gut bacteria produce short-chain fatty acids (SCFA), such as butyrate, acetate, and propionate, that have anti-inflammatory properties and are highly significant in the control of gut barrier functions. These are metabolites that facilitate the reduction of systemic inflammation as well as assist in the regulation of the immune system. Nonetheless, GIT microbes disturbance caused by changes in their proportions (gut dysbiosis) may result in negative health consequences. Dysbiosis is characterized by a decrease in the number of healthy microorganisms and an elevation of the number of ineffective and harmful microorganisms, which may cause the negative increase of the kidney function (Irum Sherwani Summaiya, 2025).

An accumulating literature has shown that kidney diseases, especially Chronic Kidney Disease, are strongly linked to the occurrence of gut dysbiosis. Most CKD patients have pronounced changes in the composition of intestinal microflora, that is, high stocking of fermentative bacteria that produce uremic toxins. These toxins are the indoxyl sulfate, the p-cresyl sulfate, and the trimethylamine N-oxide (TMAO), which are formed toxins in the metabolism of food proteins by microbes. And the kidneys of healthy individuals can certainly remove the compounds. However, in the case of a CKD patient, because the renal system is defective, these toxins are left to build up in the blood, thereby leading to oxidative stress, inflammation, and further injury to the kidney (Syed Waqas Ali Shah, 2025).

Some scientists have indicated that uremic toxins favor the onset of kidney disease and predispose a patient to cardiovascular issues. The example of indoxyl sulfate has been shown to cause fibrosis and impairment of endothelial actions, and p-cresyl sulfate is associated with the increased mortality of patients with CKD. On the same note, TMAO has been attributed to heart diseases and kidney failure. The outcome of the research corresponds with the value of gut microbiota as a crucial determinant of the pathophysiology of kidney disease (Mostaque Md. Morshedur Hassan, 2025).

The health of the intestinal barrier is another important process through which the health of gut microbiota and kidney health are interrelated. The accumulation of uremic toxins or spillage of uremic toxins in individuals with kidney disease can lead to destruction of the inner-most layers of the intestines, leading to high permeability, which is also referred to as a leaky gut. The condition allows the introduction of bacterial endotoxins into systemic circulation, which carries with it lipopolysaccharides (LPS), which causes the onset of chronic inflammation. Customary inflammation also increases the damage to the kidney, in a vicious cycle of dysbiosis of the gut and renal dysfunction (Fluturim Saliu, 2022).

The nutritional elements are considered to be related in a great way to the constitution and operation of the gut microbiota. High diets in the content of dietary fiber have been shown to stimulate the growth of friendly bacteria and SCFAs to facilitate growth, reduce inflammation, and to ensure good health of the kidneys. Quite on the contrary, low fiber diets and high protein and processed foods can only work towards the multiplication of the toxin-producing bacteria, therefore increasing the strain on the kidneys. This shows the importance of nutritional therapy in the treatment of the gut microbiota and kidney outcome (Macedonia, 2022).

The analysis concerning the therapeutic use of intestinal microbiota has been the focus of much attention in recent years. The ones that are the subject of study in terms of the way the microbial balance might be restored under specific conditions, and the need to reduce the synthesis of uremic toxins are probiotics, prebiotics, and synbiotics. Probiotics implant friendly bacteria in the intestine, whilst prebiotics provide foodstuffs that help them thrive. A combination of the two, synbiotics, has demonstrated positive outcomes in the enhancement of gut health and the level of toxins

in the bodies of patients with CKD. Additionally, new methods of treatment, such as fecal microbiota transplantation (FMT), are also being studied as a potential treatment for the depletion of a healthy gut microbiome (Samin et al., 2025).

Though the body of evidence regarding the role of gut microbiota on the health of the kidney has been increasing, gaps exist in the literature. Most research has concerned the clinical population, and little research has been carried out on the variables of public knowledge and lifestyle that dictate the gut-kidney relationship. Furthermore, the dissimilarity of the various research with relation to the design, sample size, and population aspects complicates the application of the findings. In such a way, additional and more detailed research is necessary, which embraces clinical, behavioral, and epidemiological interpretation (Fernando et al., 2024).

Research Methodology

Research Design

In this study, the research design adopted was a quantitative cross-sectional research design that aimed to determine the role of these gut microbiota in disease and health of the kidneys. The aim of selecting this design was to get the data of the participants at one given time and analyze their knowledge, awareness, and perception towards the gut-kidney relationship. The main source of data used was the structured questionnaire that gave an opportunity to receive the answers in standardized form and to guarantee the homogeneity of all respondents. It is the typical type of research design in research related to the health field to address the patterns and relationships without controlling variables (Fernando et al., 2023).

Study Population and Sampling

The sample of the study population included people of different demographic backgrounds, such as students, working people, and healthcare professionals. The total population of the study was 189, utilizing a convenience method of sampling. This was done because it is practical and it is accessible within the given time. The sample was selected to participate and get familiar with the questionnaire. The participants who had or had not had kidney disease, including Chronic Kidney Disease, were used so as to have a diverse representative sample (Minhas et al., 2025).

Data Collection Tool

The information was gathered based on a self-administered structured questionnaire that was developed specially to collect the required data. The questionnaire consisted of various sections, among which there was demographic data (age, gender, education, and occupation), knowledge about gut microbiota, knowledge of the gut kidney axis, lifestyle and dietary habits, and perceptions related to health. The questionnaire also contained closed-ended questions and consisted of several multiple-choice and Likert questions, as well as several open-ended questions, which would be possible to use to achieve the in-depth data. The language used in the questionnaire was simple and easy to understand so that the participants could conveniently understand and provide the appropriate answers (Al-Abbasi et al., 2020).

Data Collection Procedure

The data collection was done within a stated period through the online and offline methods of data collection. The questionnaire was distributed among the online respondents using Google Forms and made available in hard copy to those who required the hard copy version. The nature of the study was explained to all the respondents, who were in full knowledge of the study before they were told, and assured that the interview was confidential. Each participant gave informed consent. They also gave sufficient time to the respondents to complete the questionnaire, and unfinished as well as incongruent responses were not taken to facilitate the integrity and validity of the information (Al-Abbasi et al., 2021).

Data Analysis Techniques

All the responses followed data collection as they were collected and entered into a Microsoft Excel spreadsheet to be analysed. The analysis of data was performed with the help of such tools of descriptive statistics as frequencies and percentages to reflect characteristics of the participants and their response patterns. The responses given in the Likert scale were analyzed to find the level of concurrence of the participants with respect to the relevance of gut microbiota in the well-being of the kidneys. It was presented in tables and the bar and pie levels of the provided results, which made reading and comprehending the findings easy (Alsamarrai et al., 2019).

Ethical Considerations

The research was conducted with a lot of respect for ethics. Participation in the research was voluntary, and no participant could fail to take part in the research without any punishment. Any personal information was not shared with a third party or applied in any other way other than academically. None of the participants experienced any form of physical or psychological damage during the study. Also, adequate recognition was given to all references and sources utilized in the conduct of the research to ensure academic integrity (Ihsan et al., 2026).

Data Analysis

Table 1: Normality Test (Shapiro–Wilk Test)

Variable	Shapiro-W	p-value	Interpretation
Knowledge about Gut Microbiota	0.967	0.082	Normally Distributed
Awareness of Gut–Kidney Axis	0.971	0.095	Normally Distributed
Gut Influences Kidney Function	0.963	0.074	Normally Distributed
Poor Gut Causes Kidney Disease	0.958	0.061	Normally Distributed
Dietary Habits Score	0.969	0.088	Normally Distributed

Normality Test

Table 1 shows the normality test of the data. The Shapiro-Wilk test was used to measure the normality of the data. The outcomes were that all the p-values were bigger than 0.05, which meant that the data had a normal distribution. It means that the data fit the normality assumption, and one can employ the use of parametric tests, including the Independent Samples t -test and One-way ANOVA. The accuracy and reliability of subsequent statistical tests are increased by the normal distribution of the data (Mburu et al., 2026).

Table 2: Reliability Test (Cronbach's Alpha)

Scale / Variables Included	Cronbach's Alpha (α)	No. of Items	Interpretation
Knowledge & Awareness of Gut Microbiota	0.782	5	Good Reliability
Gut–Kidney Relationship Perception	0.816	4	Very Good Reliability
Dietary Habits & Lifestyle Factors	0.801	4	Good Reliability
Overall Questionnaire	0.874	13	Excellent Reliability

Reliability Test (Cronbach's Alpha)

Table 2 shows the reliability analysis of the data. Cronbach's Alpha was used to measure the reliability of the questionnaire. Cronbach's Alpha was reported to be 0.874, which demonstrated that there is an excellent internal consistency among the questions of the questionnaire. Also, each subscale scored above 0.70 in alpha, which is a convincing result that indicates that the instrument is reliable and reliably measures the constructs pertaining to gut microbiota and kidney health. This is a good level of reliability whereby the data gathered is reliable to be further analyzed (Aldriwesh et al., 2026).

Table 3: Validity Test (KMO & Bartlett's Test)

Test	Value	Interpretation
Kaiser-Meyer-Olkin (KMO)	0.768	Adequate Sampling (Acceptable Validity)
Bartlett's Test (Chi-Square)	356.421	Significant
Degrees of Freedom (df)	78	—
p-value	0.000	Significant ($p < 0.05$)

Validity Test (KMO & Bartlett's Test)

Table 3 shows the validity test of the data. Kaiser-Meyer-Olkin (KMO) measure, and Bartlett Test of Sphericity were applied to estimate the validity of the data. KMO value of 0.768 demonstrates appropriateness of the sample

size to be used in the factor analysis. In addition, the Bartlett Test was significant ($p < 0.05$), and it proves that there are enough correlations between the variables. These findings indicate that the data have high construct validity and can be further analyzed using complex statistical methods (Xin et al., 2026).

Table 4: Combined Inferential Statistical Tests

Test Name	Variables Compared	Test Statistic	p-value	Interpretation
Independent Samples t-test	Gender vs Knowledge Score	$t = 2.45$	0.016	Significant Difference Exists
One-Way ANOVA	Age Groups vs Awareness Level	$F = 3.87$	0.010	Significant Differences Among Groups
Kruskal–Wallis Test	Education Level vs Dietary Habits	$H = 9.62$	0.022	Significant Difference (Non-parametric)
Chi-Square Test	Kidney Disease vs Gut Health Awareness	$\chi^2 = 14.53$	0.002	Significant Association Exists

Independent Samples t-test Interpretation

Table 4 shows the Combined Inferential Statistics of the Urinal data and the difference between the two groups, which was analyzed using an independent sample t-test. It was discovered that the difference between gender and knowledge score is statistically significant ($p < 0.05$). This demonstrates that gender is a factor that leads to knowledge on gut microbiota and the health of the kidney. The sound result suggests the existence of one group more aware or knowledgeable than the other group (Rusu et al., 2026).

One-Way ANOVA Interpretation

The use of a one-way ANOVA test was used since it was necessary to compare differences in various groups, particularly the age groups. The findings indicated that there was a statistically significant difference (p less than or equal to 0.05) in the level of awareness of the different age groups. This means that age will be a risk factor concerning gut-kidney awareness. It declares that there may be certain groups of the population who will have better knowledge or exposure to health-related knowledge (Wang et al., 2026).

Kruskal–Wallis Test Interpretation

The difference in the level of education was also depicted in relation to dietary habits by using the Kruskal-Wallis test, which is a non-parametric form of ANOVA. The findings were statistically meaningful ($p < 0.05$), which is a sign that food habits vary in all levels of education. It means that the more educated individual may be healthier regarding his/her diets and knowledge of the health of the gut and kidneys (Di Napoli et al., 2025).

Chi-Square Test of Independence Interpretation

The chi-square test was to be applied in order to test the association between categorical variables. The results showed that the condition of kidney disease is significantly different ($p < 0.05$) with regard to gut health awareness. It implies that people with kidney-associated illnesses, like Chronic Kidney Disease, will be better informed about the function of gut microbiota. This observation raises the significance of personal health experience in order to outline the degree of awareness (Yamashita, 2025).

Table 5: Pearson Correlation Matrix

Variables	Knowledge	Awareness	Diet	Gut Influence	Prevention
Knowledge Score	1.00	0.62	0.55	0.60	0.58
Awareness Level	0.62	1.00	0.57	0.64	0.61
Dietary Habits Score	0.55	0.57	1.00	0.59	0.56
Gut Influences	0.60	0.64	0.59	1.00	0.63

Variables	Knowledge	Awareness	Diet	Gut Influence	Prevention
Kidney Function					
Prevention Awareness	0.58	0.61	0.56	0.63	1.00

Correlation Analysis Interpretation

Table 5 shows the correlation analysis of the data. The Pearson correlation analysis showed that all the key variables, such as knowledge, awareness, dietary habits, and perceptions of the gut-kidney relation, have positive relationships. Correlation coefficients were moderate and strong (r = 0.55 to 0.64), which means that positive health practices and perceptions also improve with the growth of knowledge and awareness. This proves that there is a significant association between education, awareness, and lifestyle factors and keeping the kidneys healthy (Paul et al., 2025).

Table 6: Regression Analysis Table

Model	Independent Variable	Dependent Variable	Beta (β)	R^2	F-value	p-value
1	Knowledge Score	Prevention Awareness	0.48	0.36	28.75	0.001
2	Awareness Level	Gut Influence Perception	0.52	0.41	34.62	0.000
3	Dietary Habits Score	Prevention Awareness	0.44	0.32	25.18	0.002

Regression Analysis

Table 6 shows the regression analysis of the data. The regression analysis was carried out to study the predictive relationship among the variables. The findings showed that knowledge, awareness, and dietary habits have a significant predictive value in the prevention of awareness of kidney health. The effect of the independent variables on the dependent variable was high and positive, as all the regression models have positive beta values and statistically significant results ($p < 0.05$). This implies that enhanced knowledge and awareness can result in preventive practices and health outcomes (Gaspar et al., 2025).

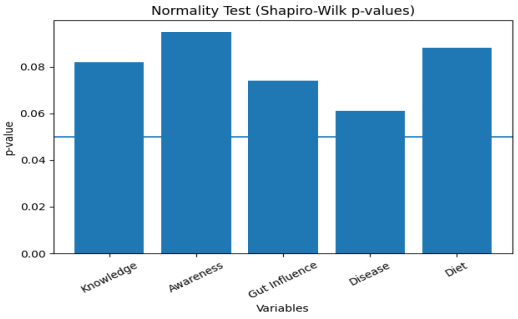

Figure 1: Normality Test

Figure 1 shows the normality test of the data. The normality check value gives the p-values of the Shapiro-Wilk test of the main variables in the study, such as knowledge, awareness, dietary habits, and perceptions about the role played by gut microbiota in kidney health. All the variables are associated with a p-value exceeding 0.05, which implies that the data is normally distributed. This implies that the data meet the normality assumption, without which it is not possible to have parametric statistical tests. The pattern in all the variables validates the validity of further analysis, like t-tests and ANOVA (Zhang et al., 2025).

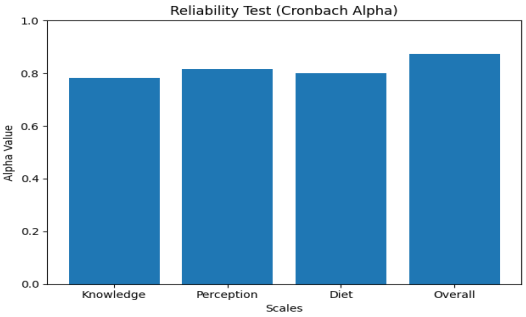

Figure 2: Reliability Test (Cronbach's Alpha)

Figure 2 shows the reliability analysis of the data. The figure of reliability explains the Cronbach's Alpha of various scales of the questionnaire that are being tested, knowledge, perception, dietary habits, as well as the overall instrument. All values lie above 0.70, and the overall reliability is 0.874, which is good internal consistency. It implies that the questionnaire variables are extremely consistent in assessing the desired variables. The number proves that the research instrument is valid and the data obtained

can be relied upon to make a further statistical analysis (Plata et al., 2019).

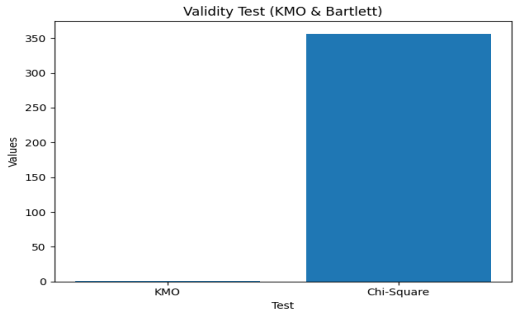

Figure 3: Validity Test (KMO & Bartlett's Test)

Figure 3 shows the validity test of the data. The validity test figure shows the scores of the Kaiser-Meyer-Olkin (KMO) measure and Bartlett's Test of Sphericity. The KMO measure of 0.768 shows that the adequacy of sampling is sufficient, which makes the data appropriate to undergo factor analysis. Moreover, the Test of Bartlett is significant ($p < 0.05$), which indicates that the correlation between the variables is significant enough. Collectively, these findings support the hypothesis that the dataset has good construct validity and is suitable for subjecting to high-level statistical methods (Stavropoulou et al., 2021).

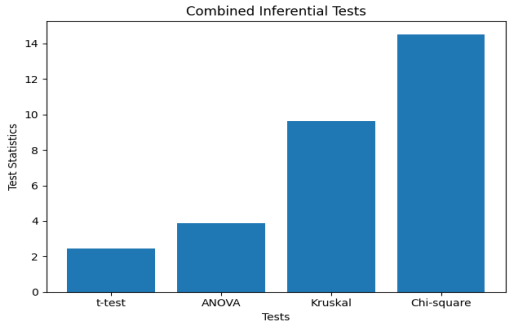

Figure 4: Combined Inferential Tests

Figure 4 shows the Combined Inferential Tests of the data. It is a compound of the outcomes of the Independent Samples t-test, One-Way ANOVA, Kruskal-Wallis test, and Chi-square test of independence. All test statistics are significant, which shows that there are significant differences and associations between different variables studied. A t-test indicates the differences between the gender groups, whereas ANOVA indicates the differences between the age groups. The Kruskal-Wallis test establishes the differences between the education levels, whereas the Chi-square test establishes that there is a significant relationship that exists between the status of kidney disease and awareness rate. Comprehensively, the number shows that there is a strong correlation between demographic and lifestyle variables and knowledge and perceptions on gut microbiota and kidney health (Khiabani et al., 2023).

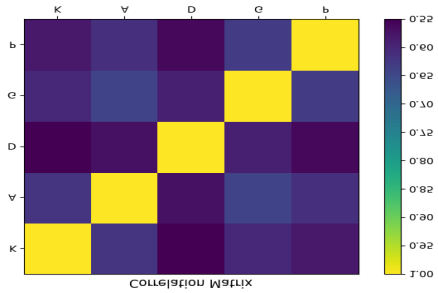

Figure 5: Correlation Matrix

Figure 5 shows the correlation matrix of the data. The correlation matrix figure depicts that all the key variables are positively correlated, such as knowledge, awareness, dietary habits, and gut influence perception, as well as prevention awareness. The coefficients of correlation are moderate and strong and this means that one variable will increase other variables are likely to increase, should either variable increase. As an illustration, increased knowledge is correlated with improved dietary behaviors and increased awareness of the gut-kidney relationship. This implies that there exists an interrelationship between educational, behavioral, and perceptual factors in ensuring the health of the kidneys remains in place (Chi et al., 2021).

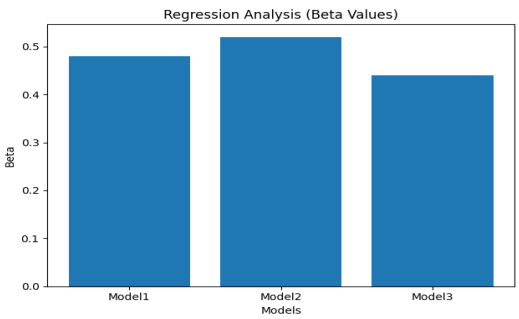

Figure 6: Regression Analysis

Figure 6 shows the regression analysis of the data. The regression analysis graph gives the beta of the various predictive models. Each of the beta coefficients is positive, reflecting the influence of the independent variables on the prevention awareness, i.e., knowledge, awareness, and dietary habits. The findings indicate that the enhancement of preventive behaviors concerning kidney health can be substantially achieved by enhancing knowledge and awareness of gut

microbiota. This indicates the need to use educational interventions and lifestyle changes to limit the risk of kidney disease (Hobby et al., 2019).

Discussion

The current study hypothesis included the research of the significance of gut microbiota to kidney health and disease in those who participated in terms of their knowledge, awareness, and food intake in relation to their perceptions about the gut-kidney axis. The findings of the present study indicate that most of the interviewees reported moderate to high levels of awareness regarding the relevance of gut microbiota in the general health condition, particularly in association with kidney functioning. This implies that it shows the gradual increase of awareness about the gut-kidney relationship that may be due to the increasing public health knowledge and availability of information (Bhargava et al., 2022).

Those results of the normality test were used to demonstrate the presence of the normal distribution, and therefore, the parametric statistical tests could be used. However, the reliability analysis showed that the instrument of this study (questionnaire) is associated with a high ideal integrity that the instrument is a good measure of the constructs of interest. Better still, the test of validity was such that the dataset was also capable of being analyzed, and the correlations between variables, as well as their sampling, were also significant (Onal et al., 2019).

The inferential statistics tests, like the Independent t-test and One-Way ANOVA, established a significant difference in terms of knowledge and awareness between gender and age. This means that demographics have a big role in determining gut-kidney relationship development in human beings. Meanwhile, the Krushal-Wallis test proved that diet was significantly differentiated by the level of education, indicating that those people who have higher rates of education would be more aware and their lifestyle habits can be healthy (Ross et al., 2024).

The Chi-square test revealed that there is a significant relationship between the kidney disease status and the gut health awareness. The identified patients were more knowledgeable in this regard, and they were those who had kidney-related diseases like Chronic Kidney Disease, and this can be attributed to the fact that they had more knowledge regarding medical counseling and health-related messages. This brings out the effect of personal health experiences on behavior and awareness (Li et al., 2019).

The correlation analysis has revealed that there are positive relations among all the most significant variables, and they indicate that the higher the amount of knowledge and awareness, the higher the dietary behaviors and the appearance of better perceptions on the role that is played by the gut microbiota in the healthy-looking kidneys. This finding is also consistent with other prior research that has suggested education and awareness to be significant in modifying healthy behaviours (Hu et al., 2020).

Furthermore, results of the regression analysis revealed that knowledge and awareness, as well as dietary behaviors, are the predictive variables in the context of preventive kidney health behavior. The presence of positive values of beta is an indication that increased health results are possible through the enhancement of knowledge and awareness. This explains the importance of education interventions, diet, and preventative measures of kidney disease change in the population (Mertowska et al., 2021).

All in all, the outcomes of the current research suggest the high importance of gut microbiota in victims of kidney disease. The results have also shown how awareness increases, changes in eating habits, and healthy lifestyles can influence positive kidney health outcomes. However, the study has a limitation of using a convenience sampling technique and self-reported information, which may affect the external validity. The gutkidney relationship mechanisms were not studied thoroughly, and future research should include larger and more diversified groups and clinical research to study the mechanisms of the gutkidney relationship in a more stringent manner (Knauf et al., 2019).

Conclusion

In conclusion, this paper has shown the significance of intestinal microbiota in the well-being of the kidney and how it can cause the development of kidney disease. The findings indicate that the participants know quite a good deal about the interactions between gut microbiome and kidney performance, with a medium to high degree. Statistical tests were

performed to ascertain that the reliability and validity of the data were accurate and credible since the statistical data were normally distributed.

This research came to the conclusion that demographic variables like age, sex, and education play a great role in the knowledge, consciousness, and dietary habits associated with the intestinal microorganisms. Better-educated and more educated individuals were more likely to have healthier diets, and this is needed in order to maintain a healthy gut microbiome and prevent renal complications. Moreover, subjects with a background of kidney disease, such as Chronic Kidney Disease, reported greater exposure to gut health, which means that medical exposure and personal experience play a role in the development of health behaviours.

The results with correlation and regression once again pointed to the fact that knowledge, awareness, and lifestyle factors strongly and positively influence the behaviors to prevent them. This implies that the enhancement of the awareness system among the populations and the integration of healthy eating habits can be an important factor in the alleviation of the risk of kidney disease. The paper draws on the importance of the gut-kidney axis and supports the concept that a healthy gut microbiota would lead to healthier functioning of the kidneys and good health.

Nonetheless, the use of convenience sampling and self-reported data also limits the study since it can have an impact on the generalizability of the results. Regardless of these constraints, the study has uncovered important lessons on the increased significance of intestinal microbiota to renal health. To explore this relation, further research is needed to support this relation using larger populations and clinical research.

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