

## Prevalence Of Diabetes Mellitus And Chronic Kidney Disease Among General Population Of Peshawar

Muhammad Idrees<sup>1</sup>, Saman Naveed<sup>2</sup>, Hazrat Hussain<sup>1</sup>, Sadia Sardar<sup>3</sup>, Muhammad Yaseen<sup>1</sup>, Hameed Ullah<sup>1</sup>, Afaq Ahmad<sup>1</sup>, Rahat Ullah Khan<sup>4</sup>, Shahab-ud-Din<sup>3</sup>, Zunaira Javed<sup>3</sup>, Mehmood Malik<sup>3</sup>, Junaid Ahmad<sup>5</sup>, Aamir Aziz<sup>3\*</sup>

<sup>1</sup>Department of Biotechnology, University of Swabi

<sup>2</sup> Department of Microbiology and Biotechnology, Abasyn University Peshawar

<sup>3</sup> Institute of Biological Science, Sarhad University of Science and Information Technology, Peshawar.

<sup>4</sup>Institute of Microbiology, Faculty of Veterinary and Animal Sciences, Gomal University

<sup>5</sup>Department of Microbiology, Hazara University Mansehra, KPK, Pakistan

---

### ABSTRACT

Diabetes mellitus (DM) is becoming a leading cause of blindness, renal failure, and death. The prevalence of DM increased gradually worldwide and is expected to expand soon. Therefore, this study was planned to study the Prevalence of DM and Chronic Kidney Disease (CKD) among the General Population of Peshawar. The present study was conducted among 200 patients presenting with DM in Lady Reading Hospital Peshawar. Methods used to diagnose DM were HbA1c, Random Blood Sugar and Fasting Blood Sugar. Among these 200 patients, 147 (73.5%) patients have DM with one or more complications. A total of 139 Diabetic patients are HbA1c positive cases, and eight patients have Random blood Sugar positive results. The study revealed that patients show a high rate of DM in age 56 – 65, including about 49(35.2%) patients. Male patients were 32 (65.3%), and 17 (34.7%) were female patients. According to patients, the main symptoms of DM were polydipsia, polyuria, and weight loss. CKD is a serious complication of DM, resulting in renal failure. In this study, it is also observed that among 147 Diabetic patients, 59 (40.1%) patients are suffering from Chronic Kidney Disease, of which 36 (61.0%) patients are males, and 23 (39%) are females. A high prevalence (61.0%) of CKD was also observed in males. The results provide an overview of the existing nature of DM in Peshawar, Khyber Pakhtunkhwa province of Pakistan. The prevalence of Diabetes in Peshawar was high and needed to be addressed through special sessions on health with the community.

**Keywords:** Diabetes mellitus, Chronic Kidney Disease, Blood Sugar, HbA1c.

---

### INTRODUCTION

Diabetes mellitus (DM), usually known as Diabetes, is a metabolic illness caused by high levels of sugar in the blood over a prolonged period (Organization, 2014). According to the International Diabetes Federation (IDF) Diabetes Atlas 2017, worldwide, around 425 million people have Diabetes, and it constitutes 8.8% of adults aged from 20-79 years. The majority of such individuals inhabit low

and middle-income countries (LMICs), which estimates 79% of diabetic patients worldwide. If these trends continue and no preventive measures are taken, the expected number of persons suffering from DM ages from 20-79 will be 629 million by 2045. According to the WHO report, the prevalence of DM is 9.8% in Pakistan, which may be increased shortly (Banilower et al., 2018). According to IDF 2013 report, the disease development will continue to exist in middle and low-income countries despite the delusion that Diabetes is "a disease of the well-to-do" (L'heveder & Nolan, 2013). It is projected that in the 21<sup>st</sup> century. Developing countries will bear 77% of the global burden of DM. This will result mainly from population explosion, ingesting unhealthy diets, fatness, inactive lifestyles, and lack of awareness and unavailability of health education (Cho, Park, Kang, Kim, & Bae, 2009). Diabetes mellitus is one of the long-lasting noncommunicable diseases which has appeared as a leading global health problem. DM has also been identified as a risk factor for vascular brain diseases, blindness, and kidney failure (Chobanian et al., 2003). Type II diabetes is mainly due to different factors, i.e. lifestyle and genetics (Ripsin, Kang, & Urban, 2009). The most notable lifestyle factors include physical inactivity, cigarette smoking, inactive lifestyle, and great drinking of alcohol (Manson et al., 2001; Sarah, Jane, Rónán, & Ben, 2004). In addition, 55% of Type II DM cases are associated with Obesity. The Childhood obesity increase between the 1960s and 2000s is supposed to have directed the rise in type II DM in children and adolescents (Olokoba, Obateru, & Olokoba, 2012). The first method to diagnose Diabetes Mellitus is HbA1c. Random & Fasting Blood Sugar Tests are used to diagnose DM. Methods to perform RBS & FBS test are both Machine-Controlled (Automatic) and Manual. The prevalence of DM is increasing gradually all over the world and there is less information available about the prevalence of DM and different risk factors and complications. Therefore, this study was planned to study the Prevalence of DM and Chronic Kidney Disease (CKD) among the General Population of Peshawar.

## **MATERIALS AND METHODS**

### **Samples Collection and Processing**

The study was conducted at Lady Reading Hospital, Peshawar, from January 2020 to April 2020. Approximately 200 blood samples were collected from patients visiting the hospital, which fulfilled our research study's inclusion and exclusion criteria. The detailed data of all patients were noted, including hospital ID, Name, Age, Gender and address. Apart from other investigations, samples were taken for the HbA1c test, Random Blood Glucose Test, and Creatinine Clearance test.

### **HbA1c Test**

For the HbA1c test, 2-3 ml of blood samples were taken through a disposable syringe in EDTA (Ethylene Diamine Tetra acetic Acid) tube and mixed gently. Then these tubes were placed in an automatic biochemical test machine COBAS c311 (Roche Diagnostics, Mannheim, Germany) for further processing following standard procedures.

### **Random and Fasting Blood Sugar Test**

A random blood sugar (RBS) test is performed to test the blood sugar level at any time or unexpected time of the day. RBS is committed to confirming Diabetes Mellitus before and during treatment. For a fasting blood glucose test, you can't drink or eat anything but water for 8-10 hours before your trial. A blood sample can be collected with a simple puncture to a finger or blood pinched from a vein.

### **Presenting Complaints of Patients at the Time of Diagnosis**

The Diabetes Mellitus diagnosis is readily performed when a patient presents with different types of classic symptoms. Various complaints were observed in DB patients at the time of Diagnosis and were noted.

### Prevalence of Chronic Kidney Disease among Diabetic Patients

Creatinine Clearance test was performed to detect Chronic Kidney Disease (CKD) in DM patients. Creatinine is measured in plasma and urine over a defined period. Different stages of CKD are shown in Table 1. For the test, 2-3 ml blood sample is taken in Heparin tube and mixed gently. Then these tubes are placed in an automatic biochemical test machine COBAS c311 for further processing following standard procedure.

**Table No. 1.** Stages of Chronic Kidney Disease

| STAGES     | SPECIFICATIONS    | RANGES         |
|------------|-------------------|----------------|
| Stage – 1  | Normal / High GFR | > 90 mL/min    |
| Stage – 2  | Mild              | 60 – 89 mL/min |
| Stage – 3A | Moderate          | 45 – 59 mL/min |
| Stage – 3B | Moderate          | 30 – 44 mL/min |
| Stage – 4  | Severe            | 15 – 29 mL/min |
| Stage – 5  | End Stage         | >15 mL/min     |

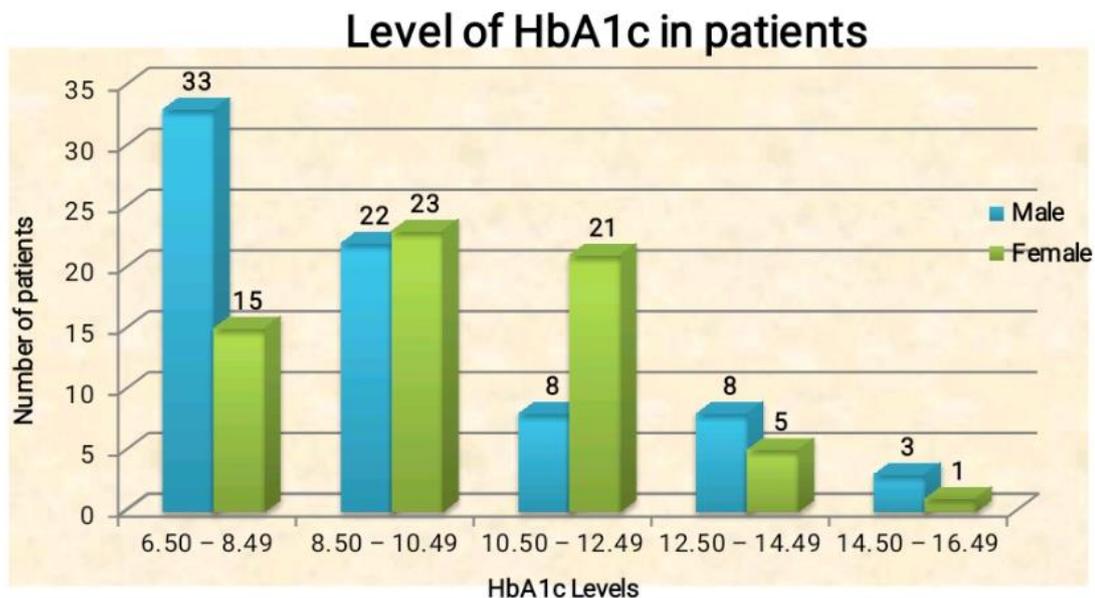
## RESULTS

### Level of Hba1c in Patients At The Time Of Diagnosis

The study population was divided into five HbA1c groups, i.e. 7.00 – 8.99, 9.00 -10.99, 11.00 – 12.99, 13.00 – 14.99, and 15.00 – 16.99. Table 2 and Fig 1 showed the number of total patients according to different HbA1c levels. HbA1c level of 6.50% and above are diabetic.

**Table No. 2.** Levels of HbA1c in patients

| HbA1c Levels    | Total Patients | Male       | Female     |
|-----------------|----------------|------------|------------|
| 6.50% – 8.49%   | 48 (34.5%)     | 33 (68.7%) | 15 (31.2%) |
| 8.50% – 10.49%  | 45 (32.4%)     | 22 (48.9%) | 23 (51.1%) |
| 10.50% – 12.49% | 29 (20.9%)     | 8 (27.6%)  | 21 (72.4%) |
| 12.50%– 14.49%  | 13 (9.3%)      | 8 (61.5%)  | 5 (38.5%)  |
| 14.50% – 16.49% | 4 (2.9%)       | 3 (75%)    | 1 (25%)    |



**Figure NO.1.** Level of HbA1c in patient, the blue bar shows male patients while the green bar shows female patients

### Presenting Complaints Of Patients At The Time Of Diagnosis

The Diagnosis of Diabetes Mellitus is readily entertained when a patient presents with classic symptoms: Table 3 showed Presenting complaints of diabetic patients.

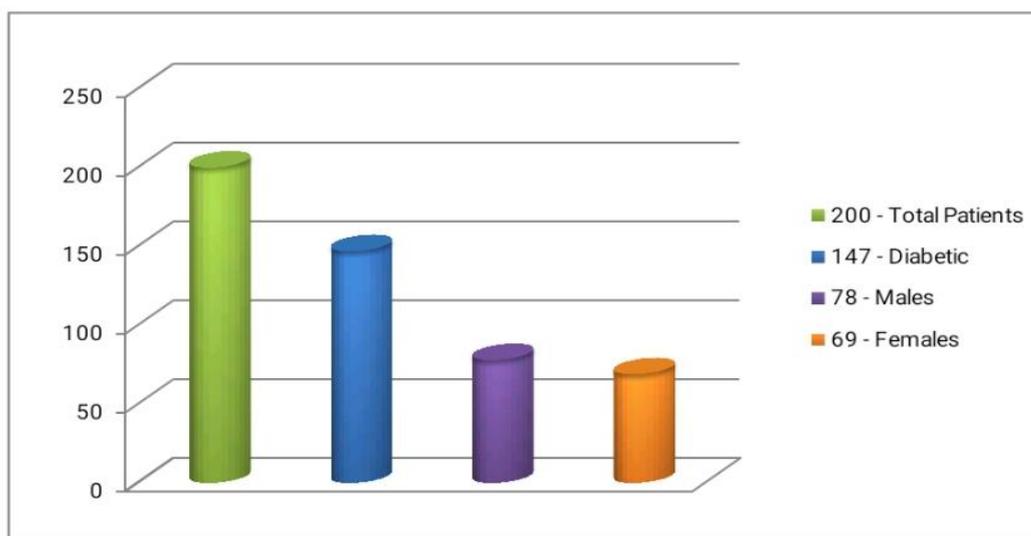
**Table No.3.** Presenting complaints of diabetic patients

| S.NO | Presenting complaints       | Percentage |
|------|-----------------------------|------------|
| 1    | Polyuria                    | 100%       |
| 2    | Polydipsia                  | 80%        |
| 3    | Polyphagia                  | 25-50%     |
| 4    | Blurred vision              | 25-50%     |
| 5    | High blood pressure         | 45%        |
| 6    | Weight loss                 | 70%        |
| 7    | Lower extremity paresthesia | 50%        |

### Prevalence of Diabetes Mellitus In Patients

The prevalence of Diabetes mellitus in patients showed in table 4. The table shows the number of total Diabetic patients according to different age groups. The table shows the maximum number of Diabetic patients the age of 56-65, in which 39 patients are males and 19 are females. Figure 2 shows the prevalence of Diabetes Mellitus in patients. A total of 200 samples were collected, out of which 147 were Diabetic. In 147 Diabetic patients, 78 patients were males, and 69 patients were females. The

green bar shows the total number of samples; the blue bar shows an unlimited number of Diabetic patients, the purple bar shows male patients, and the orange bar shows female patients.



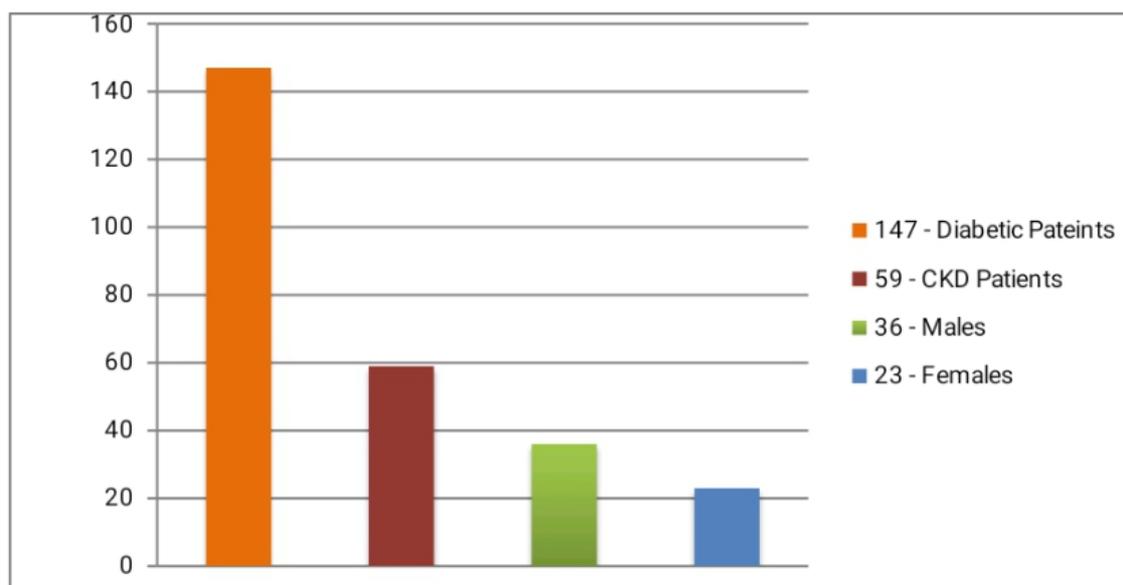
**Figure NO.2.** Show the prevalence of Diabetes millitus in patients

#### Prevalence of Chronic Kidney Disease Among Diabetic Patients

Creatinine Clearance test is performed to detect Chronic Kidney Disease in patients. Figure 3 shows the prevalence of Chronic Kidney Disease among Diabetic patients. Out of 147 Diabetic patients, 59 patients were suffering from CKD, of which 36 patients were males, and 23 patients were females. The orange bar shows the total number of Diabetic patients; the red bar indicates the total number of CKD patients, the green bar shows male patients of CKD, and the blue bar shows female patients of CKD.

**Table NO.4.** Prevalence of diabetes mellitus in patients

| Age (in years) | Total Diabetic Patients | Males      | Females    |
|----------------|-------------------------|------------|------------|
| 5-15           | 5 (3.4%)                | 4 (80%)    | 1 (20%)    |
| 16-25          | 2 (1.4%)                | 0 (0.0%)   | 2 (100%)   |
| 26-35          | 13 (8.8%)               | 6 (46.1%)  | 7 (53.8%)  |
| 36-45          | 30 (20.4%)              | 14 (46.7%) | 16 (53.3%) |
| 46-55          | 35 (23.8%)              | 15 (42.8%) | 20 (57.1%) |
| 56-65          | 49(33.3%)               | 32(65.3%)  | 17(34.7%)  |
| 66-75          | 12 (8.2%)               | 7 (58.3%)  | 5 (41.7%)  |
| 76-85          | 1 (0.7%)                | 0 (0.0%)   | 1(100%)    |



**Figure NO.3.** Shows the Prevalence of Chronic Kidney Disease Among Diabetic Patients

## DISCUSSION

Diabetes mellitus is becoming a leading cause of renal failure and mortality worldwide. The prevalence of DM increased day by day worldwide and was expected to become a nuisance shortly. Therefore, the study was planned for the Prevalence of Diabetes Mellitus and its association with Chronic Kidney Disease among the General Population of Peshawar. The present study was conducted in Lady Reading Hospital Peshawar, and about 200 patients with DM were included in the study. Among these 200 patients, 147 (73.5%) patients have DM with one or more complications. One hundred thirty-nine diabetic patients were positive for HbA1c, while 8 patients were positive for Random blood sugar. The study revealed that patients show a high rate of DM in age 56 – 65 which are about 49(35.2%) patients. Male patients are 32 (65.3%) and 17 (34.7%) are female patients. The present study was done to determine the prevalence of DM. 200 patients are included in the study, consisting of 116 (58%) males and 84 (42%) females. Out of these 200 patients, 147 patients are diagnosed with DM. The prevalence rate of DM was 73.5%, in which 78 (53.1%) are males, and 69 (46.9%) are females. It means that the prevalence rate was high in males. These results correlate with the findings of (Meo, Zia, Bukhari, & Arain, 2016). According to them, the prevalence of type 2 diabetes mellitus in urban and rural areas of Pakistan is 14.81% and 10.34%, respectively. The prevalence was higher in males than females and more common in urban areas than rural areas (Meo et al., 2016). These results are in contrast with the findings of (Xiao et al., 1999), according to the prevalence of Type 2 DM among the adult population was more prevalent in women (13.4%) than men (11.1%) with impaired glucose tolerance (IGT). The most important reason is selected patients' geographical distribution and lifestyle, as lifestyle mostly contributes to impaired glucose tolerance (Akhter, 1999). CKD is one of the serious complications of DM. The kidneys play a major role in the excretion of different waste products such as creatinine, urea, uric acid, extracellular fluid volume regulation, and different hormones. According to the National Institutes of Health (NIH), Worldwide, the total prevalence of chronic kidney disease (CKD) is around 14%, the most common causes of CKD are diabetes and hypertension. In the study, the prevalence of CKD among diabetic patients was studied; it is observed that out of 147 diabetic patients' 59 patients suffer from CKD. The prevalence rate among diabetic patients was 40.1%, in

which males represented 61.0% and females represented 39%. Pakistan must include diabetes preventive measures in their national health policy to minimize the burden of the disease. Diabetes is the most common cause of kidney failure, accounting for nearly 44 percent of new cases (Dharnidharka, Agodoa, & Abbott, 2007). There is a strong association of Diabetes with renal disease, emphasizing that CKD is linked with high rates of cardiovascular disease and mortality and should be considered part of the cardiovascular risk factors in diabetes patients (Sari & Haryanto, 2013).

## **CONCLUSION**

The results provide an overview of the existing nature of DB in Peshawar, Khyber Pakhtunkhwa province of Pakistan. The prevalence of Diabetes in Peshawar was high (73.5%) and needed to be addressed through special sessions on health with the community. There is a lack of awareness of major risk factors and some complications of Diabetes mellitus. This study would give awareness about DM and would help in minimizing DB in future generations.

## **ACKNOWLEDGMENTS**

We acknowledge Lady Reading Hospital Peshawar, Pakistan, for providing facilities for the current research study.

## **STATEMENT OF CONFLICT OF INTEREST**

The authors have declared no conflict of interest.

## **REFERENCES**

- Akhter, J. (1999). The burden of diabetes in Pakistan: the national diabetes survey. *JOURNAL-PAKISTAN MEDICAL ASSOCIATION*, 49(9), 205-205.
- Banilower, E. R., Smith, P. S., Malzahn, K. A., Plumley, C. L., Gordon, E. M., & Hayes, M. L. (2018). Report of the 2018 NSSME+. Horizon Research, Inc.
- Cho, W.-C., Park, C.-S., Kang, K.-S., Kim, C.-H., & Bae, K.-K. (2009). Conceptual design of sulfur-iodine hydrogen production cycle of Korea Institute of Energy Research. *Nuclear Engineering and Design*, 239(3), 501-507.
- ul Haq, I., Khan, M., Rehman, Z., Anwar, F., Ullah, H., & Ullah, N. (2018). HBV prevalence in the volunteer blood donors in Peshawar, Khyber Pakhtunkhwa Pakistan. *Int J Biosci*, 13(5), 50-54.
- Dharnidharka, V., Agodoa, L., & Abbott, K. (2007). Risk factors for hospitalization for bacterial or viral infection in renal transplant recipients—an analysis of USRDS data. *American journal of transplantation*, 7(3), 653-661.
- Khalid, F. (2021). Comparative Diagnostic Analysis and Biochemical Profile in Patients with Covid-19, Dengue and Acute Febrile Illness: Suggestions for Patient Controlling. *Annals of the Romanian Society for Cell Biology*, 25(7), 1733-1744.
- Ahmad, S. U., Khan, M. S., Jan, Z., Khan, N., Ali, A., Rehman, N., ... & Zahir, F. (2021). Genome wide association study and phylogenetic analysis of novel SARS-COV-2 virus among different countries. *Pakistan Journal of Pharmaceutical Sciences*, 34(4).

- Bashir, Z., Ahmad, S. U., Kiani, B. H., Jan, Z., Khan, N., Khan, U., ... & Mahmood, T. (2021). Immunoinformatics approaches to explore B and T cell epitope-based vaccine designing for SARS-CoV-2 Virus. *Pak. J. Pharm. Sci*, 34(1), 345-352.
- Olokoba, A. B., Obateru, O. A., & Olokoba, L. B. (2012). Type 2 diabetes mellitus: a review of current trends. *Oman medical journal*, 27(4), 269.
- Rehman, A., Haq, I., Asghar, M., Afridi, G. Z., & Faisal, S. (2020). Sero-epidemiological Identification of Dengue Virus in Individuals at District Shangla, Khyber Pakhtunkhwa. *Pakistan. J Biomedical Sci*, 9(3), 10
- Haq, I., Muhammad, A., Fazli Zahir, M. K., Anwar, F., Akhtar, M. S., & Ullah, F. (2020). Serological and Epidemiology study of Helicobacter pylori infection among Dyspeptic patients in District Peshawar Pakistan. *Adv. Biores*, 11(3), 81-85.
- Sarah, C., Jane, B., Rónán, O. B., & Ben, R. (2004). Quality assurance for digital learning object repositories: issues for the metadata creation process. *ALT-J*, 12(1), 5-20.
- Anwar, F., Tayyab, M., Haq, I., & Shah, O. U. (2021). Viral overload of COVID-19 pandemics: Overweight people a soft target to get an infection. *International Journal of Clinical Virology*, 5(2), 070-071.
- Xiao, R.-P., Avdonin, P., Zhou, Y.-Y., Cheng, H., Akhter, S. A., Eschenhagen, T., . . . Lakatta, E. G. (1999). Coupling of  $\beta$ 2-adrenoceptor to Gi proteins and its physiological relevance in murine cardiac myocytes. *Circulation research*, 84(1), 43-52.
- Qamar, Z., Anwar, F., Ahmad, R., Haq, I., Khan, A. M. K., Hussain, R., ... & Khan, J. (2021). Prevalence of Hepatitis C virus and determination of its genotypes in subjects of Tehsil Daggar District Buner, KP, Pakistan. *Clinical Epidemiology and Global Health*, 12, 100809.