Original Article

Preventive Health Check-Up: A Welfare Initiative for the Truck Drivers

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Abstract

Background: Truck driving is a physically and psychologically taxing job that puts drivers at risk for a number of illnesses, most notably non-communicable diseases (NCDs). Conditions including obesity, diabetes, and cardiovascular illnesses are exacerbated by a sedentary lifestyle, long work hours, and unpredictable sleep habits. By holding a preventative health check-up camp in Changsari, Assam, this study sought to evaluate the health status of truck drivers.

Methods: The health screening, which involved 325 truck drivers, involved blood pressure, body mass index (BMI), and clinical biochemical analysis utilizing "Mobilab," a portable, battery-powered, Internet of Things (IoT)-enabled biochemistry analyzer. Key health markers pertaining to anaemia, kidney, liver, and cardiovascular health were assessed throughout the examinations.

Results: This study revealed, 35% of individuals were at risk for kidney disease and 50.5% had an elevated risk of cardiovascular disease. Among all the drivers who participated in the study, 39% were found to be anaemic, and 18% had liver abnormalities. Furthermore, 21% of the subjects were overweight, and 8% had diabetes. According to BMI categorization, 12% were underweight and 3% were obese. These results show that truck drivers bear a heavy burden of lifestyle-related health concerns.

Conclusion: This occupational group urgently needs proactive healthcare treatments due to the significant prevalence of NCD risk factors. Preventive measures, such as regular check-ups with the doctor, lifestyle changes, and health education programs, should be the main focus of a comprehensive health strategy. These hazards can be reduced by promoting healthy eating, frequent exercise, and access to recurring medical examinations. Enhancing the general health and wellbeing of truck drivers may be possible through the implementation of workplace wellness initiatives and the provision of auxiliary tools like ergonomic seating and appropriate rest periods.

Keywords: Truck Drivers, Non-Communicable diseases, Portable biochemistry analyzer, Health Screening.

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Introduction

An essential component of the logistics sector, the trucking business makes it possible to move resources and goods over great distances. Because it makes it possible for raw materials and completed goods to be delivered on time across supply chains, this industry is essential to maintaining market connectedness and economic stability. However, due to the nature of their work, truck drivers are susceptible to a number of occupational health risks, such as long workdays, prolonged periods of inactivity, irregular eating patterns, elevated stress levels, lack of sleep, and restricted access to medical care [1, 2, 3, 4]. When compared to the general workforce, truck drivers have a greater incidence of non-communicable diseases (NCDs) due to the combined effects of these causes.

The disproportionately high prevalence of NCDs, such as diabetes mellitus, hypertension, cardiovascular diseases (CVDs), and chronic renal disease, among truck drivers has been highlighted by a number of epidemiological studies [5, 6, 7, 8]. Their susceptibility to metabolic problems is greatly increased by their sedentary work and unhealthy lifestyle choices, which include smoking, relying on high-calorie, low-nutrition roadside cuisine, and not getting enough exercise [9, 10, 4]. Additionally, the risks of morbidity and death in this population are increased by the lack of routine health examinations, which frequently leads to delayed diagnosis and poorly managed chronic illnesses [11, 12].

Preventive healthcare interventions have become a critical method to lessen the burden of NCDs among truck drivers in light of these alarming health disparities. In order to identify at-risk patients and provide prompt medical assistance, routine health screenings and early intervention programs are essential [13, 14, 15]. In environments with limited resources, health camps, especially those that use point-of-care testing (POCT) equipment, offer a practical and affordable way to perform quick health checks. These portable healthcare solutions improve overall health outcomes and productivity among transportation employees by providing instant diagnostic results, which aid in the early detection and timely management of chronic illnesses.

While research on truck drivers' health risks is expanding, there is a significant gap in studies that focus on the unique challenges faced by truck drivers in resource-limited regions, such as Assam. Most existing research primarily addresses the general prevalence of non-communicable diseases (NCDs) among truck drivers, but it often overlooks the contextual factors like diet, environmental conditions, and limited access to healthcare that are specific to these areas. Additionally, many interventions focus on raising awareness but do not address the critical need for accessible, affordable diagnostic solutions that can facilitate early detection and management of chronic conditions.

This study seeks to address these gaps by assessing the health status of truck drivers in the Changsari area using the "Mobilab" point-of-care testing (POCT) device. By offering cost-effective and efficient health screenings, it aims to identify key health risks and provide tailored healthcare solutions that can be implemented in resource-limited settings. The findings could contribute to the development of scalable healthcare models that not only improve the health outcomes of truck drivers but also have the potential to be replicated in other similar regions facing similar challenges.

Material and Methods

Methodology

Study design and settings

The study was carried out in Changsari, Assam, as a preventative health check-up camp as part of this community-based, cross-sectional study. Over the course of 80 hours, 325 truck drivers were enrolled and investigated. Using a standardized screening methodology, the study sought to evaluate important health markers linked to NCDs.

Methods of Screening

Comprehensive health evaluations were performed on the participants, and these included:

(a) Anthropometric Measurements: Standardized equipment was used to record height, weight, and BMI.

(b) Vital Signs: An automatic sphygmomanometer was used to measure blood pressure.

(c) Biochemical Analysis: Qualified phlebotomists took around 2 milliliters of venous blood. Centrifugation was used for five minutes at 3,500 rpm in order to separate the serum from the blood

sample. Mobilab, a portable, battery-powered, Internet of Things-enabled biochemistry analyzer with a diagnosis accuracy of over 90%, was used to assess the biochemical parameters.

Evaluated parameters:

(a) Cardiovascular markers: LDL, triglycerides, and total cholesterol

(b) Tests for liver function: total protein, albumin, and bilirubin

(c) Kidney function tests: creatinine and uric acid

(d) Hemoglobin levels are used in haematological evaluation to identify anaemia.

(e) Blood glucose testing at random for diabetes detection.

Table 1: Biochemical Methods used for test parameters

Sl No	Test Name	AnalyticalMethod–Mobilab
1	Cholesterol (CHOL)	CHOD-PAPmethod [16]
2	Triglyceride (TGL)	GPO-PAPmethod[17]
3	UricAcid (UA)	UricasePAPmethod[18]
4	Glucose (GLU)	GOD-PAPmethod[19]
5	Hemoglobin (HB)	Cyanmethemoglobinmethod[20]
6	TotalBilirubin (TBIL)	Modified DMSO/Diazomethod [21]
7	Creatinine (CRE)	Enzymaticmethod [22]
8	LowDensity Lipoprotein-Cholesterol (LDL-C)	Selective Solubilization Method [23]
9	Albumin (ALB)	BromocresolGreen[24]
10	TotalProtein (TP)	DirectBiuretmethod [16]
11	HDL	Calculated[25]
12	Globulin	Calculated[26]
13	A/G Ratio	Calculated [26]

Table 2: Range of test parameters used for the screening[26]

Test Parameters	Ranges used for the survey				
	Low	Normal	Borderline	High	Units
Total Cholesterol	-	< 200	200 - 239	>240	mg/dL
Triglyceride	-	< 150	150 - 199	> 200	mg/dL
Uric Acid	< 3.5	3.5 - 7.2	-	> 7.2	mg/dL
Glucose	< 70	70 - 140	-	> 140	mg/dL
Haemoglobin	< 13.2	13.2 - 17.3	-	> 17.3	g/dL
Total Bilirubin	-	< 1.2	-	> 1.2	mg/dL
Creatinine	< 0.74	0.74 - 1.35	-	> 1.35	mg/dL
Total Protein	< 6	6 - 8	-	> 8	g/dL
LDL	-	< 130	130 - 159	> 160	mg/dL
Albumin	< 3.5	3.5 - 5.2	-	> 5.2	g/dL
HDL	< 35	35 - 80	-	> 80	mg/dL
Globulin	< 2	2 - 3.5	-	> 3.5	g/dL
A/G Ratio	< 1.1	1.1 - 2.5	-	> 2.5	-
BP	Sys < 90 and Dia < 60	Sys < 130 and Dia < 80	-	Sys > 130 or Dia > 80	mm Hg
BMI	< 18.5	18.5 - 24.9	-	> 24.9	kg/sq. m

Ethical Consideration

All participants gave their signed, informed consent prior to participation. The study ensured anonymity and voluntary involvement by adhering to ethical norms set forth by the Indian Council of Medical Research (ICMR), Government of India.

Results

In Changsari, Assam, 325 truck drivers underwent a preventive health test, which yielded important insights into their health risks. Non-communicable diseases (NCDs), such as metabolic disorders, liver abnormalities, kidney dysfunction, cardiovascular diseases, and anemia, were found to be highly prevalent. The results underscore the occupational health burden among truck drivers, primarily attributed to stress, poor dietary habits, sedentary work conditions, and limited access to healthcare [9][5]. Figures 1–5 summarize the statistical analysis results.

Health Risk Distribution by Age Group

Figure 1 illustrates the distribution of health risks across different age groups. The majority of participants were between the ages of 30 and 50, representing a critical working demographic vulnerable to various illnesses. This finding aligns with prior research indicating that middle-aged truck drivers are particularly susceptible to chronic diseases due to unhealthy lifestyle practices and prolonged occupational stress[9].

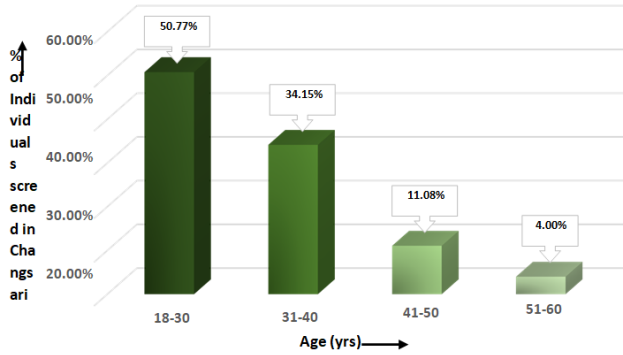

Figure 1: Age-wise distribution of individuals screened in Changsari. The bar chart shows the percentage of individuals screened across four age groups. The highest proportion, 50.77%, belongs to the 18–30 years age group, followed by 34.15% in the 31–40 years group. The 41–50 years group constitutes 11.08%, while the 51–60 years group accounts for the lowest percentage at 4.00%. This data highlights the age demographics of the screened population.

BMI and Blood Pressure Analysis

According to anthropometric measures, 21% of truck drivers were overweight, 3% were obese, and 12% were underweight, while 64% had a normal BMI (Figure 2). Hypertension, a recognized risk factor for cardiovascular disorders, is correlated with abnormal BMI [13]. Research shows that high-calorie diets and sedentary work habits lead to obesity, which raises the prevalence of hypertension [11].

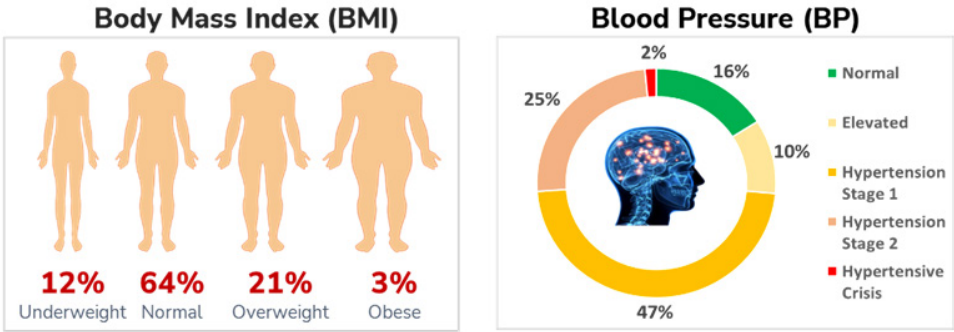

Figure 2: Health distribution based on Body Mass Index (BMI) and blood pressure status. The left panel depicts BMI categories, showing the proportion of individuals in each category: 12% are underweight, 64% have a normal BMI, 21% are overweight, and 3% are obese. The right panel illustrates the distribution of blood pressure categories: 16% have normal blood pressure, 47% have elevated blood pressure, 25% are in hypertension stage 1, 10% are in hypertension stage 2, and 2% are in a hypertensive crisis. These data provide insights into weight and blood pressure-related health conditions.

Cardiovascular Health Risks

As illustrated in Figure 3, 50.5% of truck drivers were at risk of cardiovascular diseases (CVDs), with 5.54% classified as high risk. These findings support previous research linking long sitting hours, high-stress work environments, and processed food intake with increased risk of hypertension and dyslipidemia[13]. Regular health screenings and dietary interventions are essential in reducing cardiovascular risks in this population[14].

Kidney Function and Chronic Kidney Disease (CKD)

According to renal function analysis, 5% of truck drivers had chronic kidney disease (CKD), and 35% had kidney dysfunction (Figure 4). This is in line with studies that demonstrate renal stress is exacerbated by prolonged dehydration, high sodium intake from roadside food, and limited access to restrooms[9]. The risk of CKD can be reduced by preventive strategies including regular renal function testing and hydration awareness campaigns[15].

Liver Function Abnormalities

According to liver function evaluations, 18% of individuals exhibited abnormal liver parameters, which could indicate that they were at risk for non-alcoholic fatty liver disease (NAFLD) (Table 2). The metabolic syndrome, high-fat diets, and excessive alcohol use are major causes[8]. Preventive intervention can benefit from early detection using point-of-care testing (POCT) tools such as Mobilab[10].

Anaemia Prevalence

Among truck drivers, anaemia was very common (39%) (Figure 4). Iron-deficient diets, chronic weariness, and the use of NSAIDs for pain management are the reasons for this, which is much greater than the norm for the general population[16]. Supplementation and better eating practices are essential for occupational health since anaemia impairs alertness and productivity at work[17].

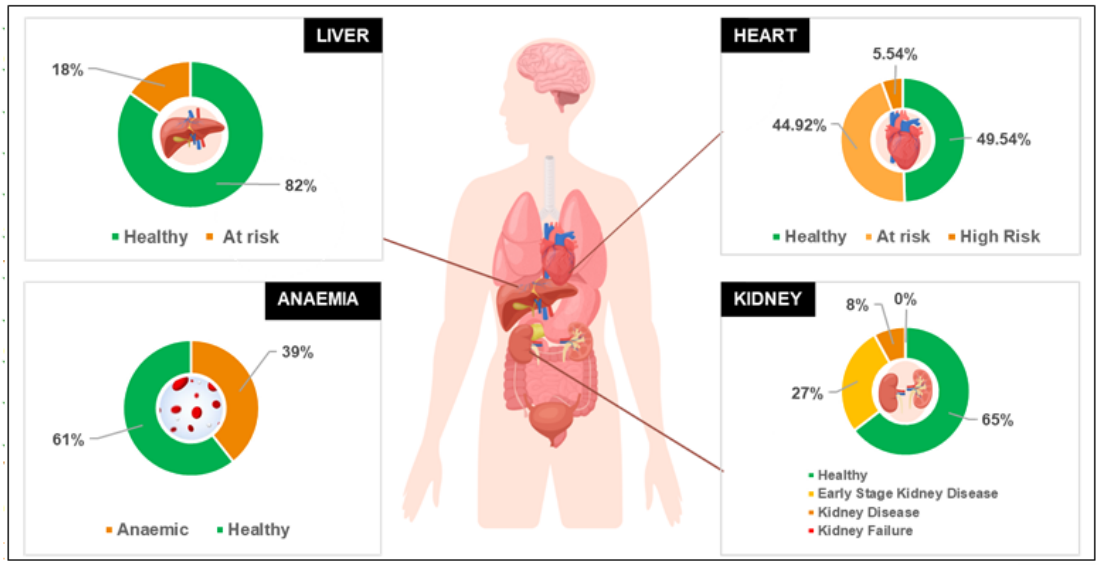

Figure 4: The figure illustrates the health status of key organs and anaemia assessment based on clinical parameters. The central image highlights the liver, heart, kidneys, and blood (for anaemia). Surrounding pie charts provide a summary of health conditions for each parameter. For the liver, 82% of individuals are healthy, while 18% are at risk. In the case of the heart, 44.92% are healthy, 49.54% are at risk, and 5.54% are at high risk. For kidney health, 65% of individuals are healthy, 27% have early-stage kidney disease, 8% have kidney disease, and 0% have kidney failure. Regarding anaemia, 61% of individuals are healthy, while 39% are anaemic. This comprehensive depiction highlights the proportion of individuals at risk or suffering from specific health conditions.

Diabetes and Blood Glucose Levels

8% of participants had increased glucose levels, putting them at risk for diabetes, according to blood glucose screening results (Figure 5). According to

research, excessive sugar consumption, irregular meal schedules, and sedentary lifestyles are the main causes (Sharma et al., 2022). This risk can be controlled by promoting balanced eating and physical activity (Verma et al., 2020).

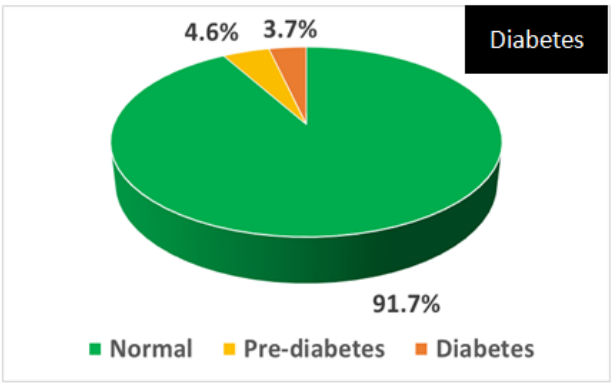

Figure 5: This figure illustrates the distribution of diabetes and pre-diabetes among the truck drivers screened during the preventive health check-up. The majority (91.7%) of participants exhibited normal blood glucose levels, while 4.6% were classified as pre-diabetic, indicating an increased risk of developing diabetes in the future. Additionally, 3.7% of the participants were diagnosed with diabetes

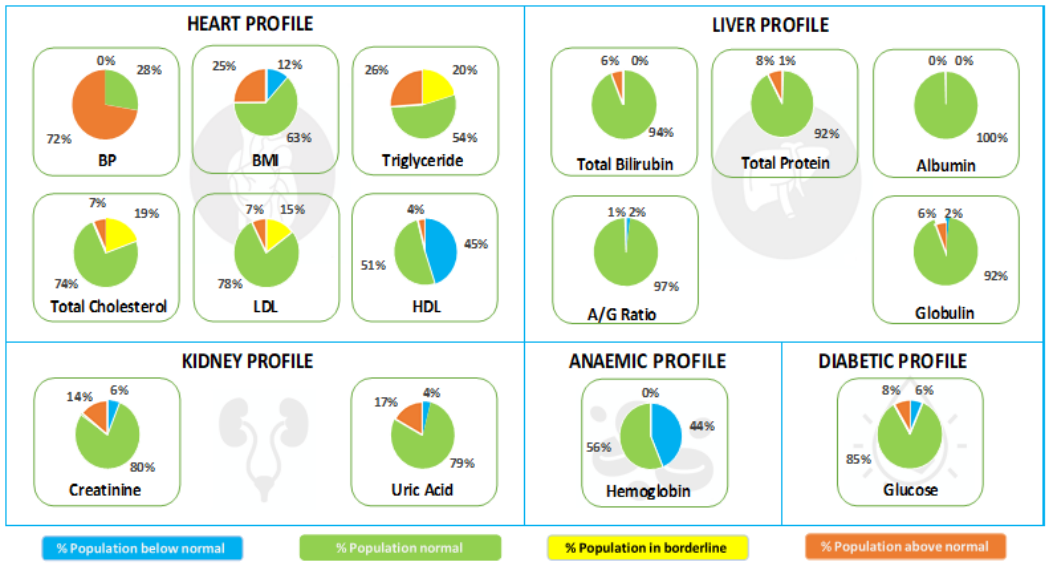

Figure 3: A comprehensive overview of health profiles categorized by organ function and condition type, highlighting the percentage distribution of clinical parameters associated with potential health risks or diseases. The Heart Profile indicates that 28% of individuals are at risk due to abnormal Blood Pressure (BP), 12% due to abnormal Body Mass Index (BMI), 26% due to elevated Triglycerides, 7% due to high Total Cholesterol, 11% due to elevated Low-Density Lipoprotein (LDL), and 51% due to low High-Density Lipoprotein (HDL). The Liver Profile shows that 6% of individuals have abnormal Total Bilirubin, 8% have abnormal Total Protein, 0% have abnormal Albumin, 1% have abnormal Albumin-to-Globulin (A/G) Ratio, and 6% have elevated Globulin levels, indicating possible liver dysfunction. The Kidney Profile identifies 14% of individuals with elevated Creatinine and 17% with high Uric Acid, suggesting potential kidney impairment. The Anaemic Profile reveals that 56% of individuals are at risk of anaemia due to low Hemoglobin levels. The Diabetic Profile highlights that 8% of individuals have elevated Glucose levels, indicating a risk of diabetes. These percentages provide a detailed assessment of individuals at risk for various diseases or conditions based on the abnormal ranges of these clinical parameters.

The Changsari health camp's findings underscore the critical need for preventative healthcare measures by highlighting the substantial health risks faced by

truck drivers. The high prevalence of NCDs in this population is a result of occupational hazards such extended sitting, unpredictable eating schedules, and restricted access to healthcare.

Discussion

The present study provides a comprehensive health risk assessment of truck drivers in Changsari, Assam, revealing a concerning prevalence of metabolic disorders, cardiovascular risks, and other non-communicable diseases (NCDs). The findings are consistent with several national and international studies highlighting the occupational vulnerabilities associated with long-haul trucking.

The cardiovascular health profile (Figure 3) shows that 50.5% of drivers had at least one risk factor, with 28% presenting abnormal blood pressure, 26% elevated triglycerides, and 51% low HDL. These numbers align with the results reported by Sharma et al. [4], who observed high levels of dyslipidaemia and hypertension among Indian commercial drivers, attributing the cause to prolonged sedentary hours and poor dietary practices. Similarly, Patel et al. [3] found that truck drivers were at a significantly higher risk for cardiovascular events due to chronic occupational stress and lack of medical monitoring.

The high rate of anaemia (56%) found in this study also mirrors the findings of Mehta et al. [6], who reported anaemia prevalence exceeding 40% among male transport workers, often linked to iron-deficient diets and gastrointestinal disturbances induced by irregular eating patterns and frequent NSAID use. The implications are especially significant in safety-sensitive occupations such as trucking, where reduced alertness due to anaemia can compromise road safety.

In terms of liver and kidney function, 18% and 35% of drivers, respectively, showed signs of hepatic or renal abnormalities (Figure 3), similar to the prevalence observed in studies by Gupta et al. [1] and Verma et al. [5]. These abnormalities were commonly associated with lifestyle factors such as alcohol consumption, poor hydration, and frequent intake of high-sodium processed foods—all prevalent in roadside eating habits. Our results reinforce the urgent need for awareness campaigns around hydration and dietary control.

The diabetic and pre-diabetic prevalence, although relatively low at 3.7% and 4.6% respectively (Figure 5), still highlights a population at risk. As per Singh et al. [2], the gradual rise in type 2 diabetes among transport workers is often preceded by undiagnosed pre-diabetic conditions due to irregular check-ups and lack of early interventions. The early identification of these cases in our study indicates the utility of portable diagnostic tools like Mobilab in providing preventive care in remote or mobile populations.

Overall, our findings are congruent with existing literature and underline the multifactorial risks that truck drivers face. This study adds value by deploying a point-of-care testing (POCT) device for rapid biochemical profiling in field conditions, thereby demonstrating a scalable model for occupational health screening. There remains, however, a need for regular follow-ups and integration of such screenings into routine policy-driven occupational health programs.

Conclusion

The urgent need for focused health interventions is highlighted by the high frequency of metabolic illnesses, anaemia, liver abnormalities, kidney dysfunction, and cardiovascular risk among Changsari truck drivers. Early detection of non-communicable diseases (NCDs) was made possible by the deployment of Mobilab, a portable IoT-enabled biochemistry analyzer that allowed for quick and precise health assessments. Given the vital role truck drivers play in the logistics industry, organized healthcare programs that include lifestyle changes, preventative care, and recurring Mobilab screenings can greatly improve road safety and truck drivers' well-being. To assess the long-term effects of such healthcare programs, future research should build on these findings using larger sample numbers and longer treatments.

Limitation of the Study

This study was limited by its cross-sectional design, which provides only a snapshot of the health status of truck drivers at a single point in time. The relatively small sample size and regional focus on the Changsari area may not fully capture the broader

health landscape of truck drivers across different geographies. Additionally, self-reported lifestyle data were subject to recall bias. Future longitudinal studies with more diverse and representative populations are needed to validate these findings and track changes over time.

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Ethical Clearance/Statement of Ethics: Not Applicable

Conflicts of interest statement: All authors declares no conflicts of interest

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