**Evaluation of the Methods Used to Collect Sodium Intake Data**

**Introduction**

Dietary data and weighed diet records are commonly used by researchers and participants to monitor the nutrients intake. These methods have been considered to be labour intensive for the accurate data to be achieved. Sometimes the subjects can change their behaviour when the dietary information is being collected. The purpose of this paper is, therefore, to identify and analyse population-based dietary data and their shortcomings. Sodium is an example of a mineral that is found in a range of foods. It is therefore common to report under-intake of sodium in dietary data. Participants with a high body mass index (BMI) are likely to fall the victims of under-reporting when it comes to sodium intake. The methods that are used to collect the sample for analysis of sodium salt such as the 24-hour urinary collection are tiresome and cannot accurately identify incomplete samples [5]. Spot urine which has found a wide application as the alternative method is also labelled as controversial and limited [12].

**Interpretation of Population Based Dietary data (Comparison of the Intake Data with Nutrients Reference Values)**

Adequate Intake (AI) is the daily average daily intake of nutrients important in the prevention of chronic diseases [3]. The average refers to the medium intake of the population. UL is the highest intake of sodium that will cause no risk to the general population. If the UL is exceeded then there is likely to be adverse health effects risks. The data sodium intake is very important in that sodium is associated with adverse health conditions such as the high blood pressure which is a significance risk for cardiovascular diseases which has been associated with premature death in children and the adolescents. The nutrients reference values, the UL and the AI, are very important because they have the capability to impact public health.

There is evidence that has related the increase in intake of sodium with increasing blood pressure. The AI falls with the dietary requirement of sodium intake. As a result, the local policy is implementing the use of AI to reduce the cases of excessive intake of sodium which in turn reduces the cases of high blood pressure and cardiovascular diseases in children and the adolescent [17]. The UL value currently stands between 1200 and 3300mg while the AI at a value not above 2,300 mg/day while the lower limit is not determined in that, it is difficult to determine a single point below which the risk is low. I would propose the efforts to reduce the current sodium intake in the society be pursued with more energy than the way it is being done at the moment. These are the public health activities that are directed towards reducing blood pressure among children and the adolescents.

**A Critique of Population Based Dietary Data Based on the Methods Used to Collect Sodium Intake**

The 24-hour method can’t be said to be the most accurate method since it is tiresome to the participants [5]. This may influence how the data is collected since some participants may find it had to collect the data consistently for the 24-hours [2]. There are cases where the response rate has been reported as low as 10%. Due to the difficulties in collection of the data using the 24-hour collection method, there have been reported over-collection and under-collection. Researchers are currently working on a new method to determine the sodium intake. This is the application of single spot urine to estimate 24-hour sodium urinary excretion. Single spot urine can be collected in a single encounter, eliminating the need for multiple visits. It can be in cooperated in a wider population health with a lot of ease [10]. They also eliminate the cases of over and under collection of urine samples. Several researchers have praised the ease by which the spot urine samples are collected and stored without the potential of over or under-collection.

The participants visit the clinic just once, the spot sample is collected as a single pass and then stored in an airtight container of a small size. If the samples are to be stored for an extended period of time, they are frozen [16]. The researcher then records the parameters they use in the calculation such as age, sex, height, weight and urinary potassium and creatinine in order to determine the urinary sodium outcome. Due to the above advantages, the researchers are abandoning the 24-hour urine collection method for spot urine method. The estimations that are made during the spot urine method are still being investigated and are labelled controversial because there is no specific way they can be validated.

**A Critique of Nutritional Peer Reviewed Literature**

According to a report by Espeland MA, Kumanyika S and Wilson AC et.al, Para-aminobenzoic acid (PABA) has been used in recent surveys in Australia to determine the completeness of data [3]. The subjects were administered with PABA: which requires them to take the tablets three times a day. This was to be distributed during the morning, lunchtime and evening meal hours. The samples that reported less than 85% of the PABA were considered to be incomplete. Originally, the incomplete collections were disregarded when using the 24-hour collection method [15]. But the researchers are now devising ways of collecting data to compensate for the under collection, especially after a study conducted by Pérez-Escamilla R and Hromi-Fiedler et.al reported 71% of collection in a single study as incomplete. But there are several challenges the researchers faced while collecting the data. For the participants who are relatively aged, there is the decline in the rate of excretion [14]. This will definitely interfere with the estimated sodium intake. The other shortcoming is the non-adherence coming from the failure of participants to observe the dosage regimes. The participants may also be under medications at the same time they are administered with the PABA. This will definitely interfere with the outcome of the data.

The methods used to estimate the complete urine collection include assessment of 24-hour urine volume and 24-hour creatinine excretions. The 24-hour creatinine excretion is based on body weight, sex, age and protein intake [13]. The method has unacceptably low sensitivity for detecting all the incomplete samples. Recent studies conducted in Australia indicated that only 85% of the participants returned a complete 24-hour urine collection [8]. In other regions, incomplete collections have been reported to be high. A case is given of a study conducted in the United Kingdom where only 52.3% were complete urine collections using the PABA recovery method [9]. The researcher went ahead to make adjustments to the incomplete samples so that they can be used in the survey. Even though this study assumes the 24-hour collection method to be the gold standard, it is tiresome and time-consuming, to both the participants and the researchers. The Studies fails to tell us what they do get accurate data in case the participants decide to hide the details about spilled samples during collection. More studies are therefore required to find a more appropriate method that will give satisfactory results.

A study by Witte EC and Heerspink HJ et.al has tried to come up with several methods to validate their findings using the spot urine strategy. This involves the conversion of the spot urine test into an estimate of the 24-hour excretion with the help of spot urine sodium: creatinine ratio as a way to control urinary concentration [6]. A study done in Japan from 592 participants (296 women and 295 men) from INTERSALT using the analysis of 24-hour urine excretion and the spot samples, also attempted to validate the results [11]. Another study was conducted in Japan with a slightly lower number of participants (81 women and 78 men). The most recent study can be said to be the derived calibration of the spot urine and 24-hour urine samples from the Western INTERSALT study, which involved 2852 females and 2841 males - which was conducted by Hashimoto T and Yagami F et.al. The participants were adults between 20 and 30 years of age coming from Europe and Australia.

Validations attempts from these studies are not satisfactory and people continue to question the effectiveness of the spot urine method used in these studies. There are questions which are left unanswered from these studies. For example, is an estimate based on a single pass of urine a true reflection of a person’s mean 24-hour excretion as the gold standard measure? Or is the estimate founded on the mean of a single spot urine collection in a population, a true reflection of the mean sodium intake for the entire population [12]? The spot urine concentration will only represent sodium intake for a short duration even if sodium: creatinine ratio is applied to account for the urinary concentration. This information is likely to be invalid since the intake of sodium has been proven to be different with the samples collected during the day reporting high sodium concentration than those collected at night. These studies therefore reports a lot of biases that more studies need to be carried out on this topic to find more accurate data.

**Strategy to Reduce Sodium Intake**

Sodium intake an important component of the daily diet but if excessively consumed can contribute to elevated blood pressure. It is therefore important to come up with a strategy to reduce the intake of sodium. Educating the public upon their health is one of the strategies [7]. This will create awareness on the health complications that may result from high sodium intake. Food labelling and counselling the individuals upon their health is another strategy [3]. Coordinated and voluntary sodium reduction by the industry. Coming up with legislations and regulation that govern the amount of sodium that is used in the food products by the manufactures will also go a long way in reducing sodium intake.

**Conclusion**

Population based dietary data is very important in planning for nutritional and health related issues that affect the population at large. The different methods used to determine the population based dietary data are: the 24-hour urine collection method is considered by most as the gold standard for determining the sodium intake. But the work that is required to collect the data is very tedious and time-consuming for both the participant and the specialist conducting the research. In the spot urine collection method, only a single pass of urine is required. This is then estimated to represent the mean excretion by an individual for a period of hours. These methods are based on some level of estimations and are therefore not accurate results of sodium intake as much as the data is important in informing major health decisions. Nutrients reference values for sodium intake has been set at 2,300mg/day and below for Adequate Intake (AI) and between 1200 and 3300mg for UL (the highest intake of sodium).

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