Bangungut Syndrome: Sudden Unexpected Nocturnal Death Among Filipino and Thai Construction Workers in the Eastern Province, Saudi Arabia

E. A. Faris, S. El-S. Fathalla


During the 9 years from 1980 to 1989, 58 cases of Bangungut syndrome. (Sudden Unexpected Nocturnal Death: SUND) have been studied and recorded in our centre. Extensive laboratory and post-mortem investigations revealed inconclusive causes for this syndrome, paralleling the experience of authors worldwide. However, our main findings indicate that Bangungut syndrome occurs in apparently healthy Filipino, Thai and Korean males aged 25-45 years during their first year after arrival in Saudi Arabia. Aetiological theories and hypotheses are discussed. It is recommended that there should be an adequate daily intake of thiamine available to workers of these nationalities especially during the first year after their arrival, as thiamine deficiency may play a role in developing Bangungut syndrome. Also physicians should be aware of the possibility of this syndrome occurring in their practice.

Bangungut syndrome (pronounced as Bah-noo-noot)—a Tagalog (National filipino language) word—was first used in the medical literature in 1915, in Manila to describe sudden unexpected nocturnal death (SUND) that happen in young, apparently healthy, adult males from the Philippines, Thailand and other neighbouring countries. These deaths occur at night or in the early hours of the morning during sleep.1-3 Few reports about Bangungut have been published worldwide,2-11 while to the best of our knowledge nothing has been published from Middle East countries that recruit many workers from the relevant Pacific areas. Our report seems to be the first from Saudi Arabia.

Subjects and Results
Many construction workers in the eastern province of Saudi Arabia are recruited from the Philippines, Thailand, and Korea. These workers live in crowded accommodation and work in a hot and humid environment, often working for long hours without rest. This may lead to fatigue and dehydration, which can cause an increased risk of Bangungut syndrome.
and Korea. These nationalities are known to be prone to Bangungut syndrome. In the Forensic Medicine Center, we have examined many deaths that occurred among apparently healthy males who were citizens of these countries. In our 9-year study (January 1980 to December 1988) we recorded a total of 58 cases of Bangungut syndrome (SUND). There were 32, 23 and three cases respectively among Filipino, Thai and Korean males. The deaths occurred singly and sporadically without any geographical or seasonal preference. It was noticed that all Bangungut cases were among healthy males between the ages of 25 and 45 years (mean 35 years); All incidences were to newly recruited workers between 2 and 12 months (mean 7 months) after their arrival to start work. These men had all been medically examined in their country of origin before being permitted to work in Saudi Arabia. They had all seemed healthy the day before they died, and had eaten dinner (mostly rice) before going to bed. The deaths were discovered the following morning.

When witnesses were available, room mates reported being awakened by noisy breathings and gaspings — and death followed soon afterwards. All the cases in this study were included because of this typical history of death, while any other deaths that happened in this group of workers which did not fulfil the criteria of Bangungut syndrome were not included in our study.

Autopsy findings
At necropsy — which is a routine in all sudden unexpected, unexplained deaths — we recorded: 93% of cases showed no cardiac hypertrophy or coronary arterial diseases; 7% of cases showed partial coronary occlusion in 72% there was moderate to severe intraalveolar haemorrhage in both lungs as evidenced by the presence of petechial haemorrhagic spots (Tardieu's spots) under the visceral-pleurae of the lungs, and was accompanied by pulmonary oedema in some cases.

Histopathological studies
Myocarditis and/or pneumonitis was reported in 8% of cases. Virological and microbiological studies were inconclusive, as were drugs, alcohol and toxicological studies. The actual cause of death was not known, although the immediate cause of death was presumed to be ventricular fibrillation of unknown aetiology.

Discussion
Perhaps the existence of the Tagalog word Bangungut, to describe the syndrome of sudden unexpected/unexplained nocturnal death (SUND), gives a hint of the ancient history of the syndrome, which may have existed before the Spanish discovery of the archipelago in the early sixteenth century, when it was named the Philippines.

The immediate cause of death in all the previously published cases was ventricular fibrillation without underlying cardiovascular disease,1−3,5,7 while cardiac conductive system anomalies were reported in some cases but with unknown significance.12,13 Many theories have been advanced to explain this mysterious Bangungut syndrome.

A stress theory has appeared because Bangungut syndrome usually occurs in newly recruited workers. The stress may be due to maladjustment to the new environment, separation from family and loved ones, socioeconomic problems, long working hours and/or other factors. These may lead to severe stress that can lead to fatal arrhythmias.14 The risk seems to diminish after a period of adjustment. In our series of cases all the victims had been newly recruited and not a single case was recorded after 1-year's residency. However, since men from other countries working and living under the same conditions in Saudi Arabia do not die in the same way, factors other than stress can be taken into consideration.

We did not find any evidence that viral, microbiological or toxicological agents had any role in our cases or in other published series, so diet might be a possible factor. The main food consumed by these nationalities is rice, which is subjected to vigorous washing three times before cooking. This practice may cause deficiency of thiamine below WHO standards.13 Thiamine deficiency is known to be widespread among poor Filipino and Thai people, and this leads to cardiac and neurological effects including cardiac conduction abnormalities, cardiac arrhythmias, increased risk of death in patients with Wernicke encephalopathy and Korsakoff's psychosis. It has also been reported to cause sudden unexpected death in sleep among dogs.6,16−19

However, the diet hypothesis alone does not explain the greater incidence of Bangungut syndrome among males, because the same diet is taken by both men and women. However, age and sex differences in susceptibility to thiamine deficiency may play a role and may be a possible explanation of why young males are the only victims. In a recent unrelated study in Gambia, West Africa, thiamine deficiency was more prevalent among middle-aged men than in women living under the same conditions.20

The relationship between thiamine deficiency and Bangungut syndrome needs further investigation, and we recommended that the daily intake of thiamine to those workers should be increased until the actual cause of Bangungut syndrome is discovered. We also recommend an extensive study to answer the intriguing and unexplained question of why Thai infants are at nearly zero risk of sudden infant death syndrome (SIDS), while young adult males are at great risk of Bangungut syndrome.21 This approach might help solve the problem of SUND in Filipino and Thai males.

We want to stress that our total of 58 cases in 9 years, must not be taken to represent the total number of cases of Bangungut syndrome which occurred in our province as it is possible that many
other cases may have been referred to other hospitals and health care units and not recognized. Consequently we recommend that physicians who issue death certificates must be aware of the Bangungut syndrome in workers of Philippine and Thai nationalities, and also in workers of other nationalities who are victims of sudden unexpected unexplained nocturnal deaths.

Comment
The theory is advanced that thiamine deficiency plays the major role in the aetiology of Bangungut syndrome among a genetically and culturally distinct group (defined by diet, sex and age). Thiamine deficiency results directly from eating pre-washed rice, and indirectly from the consumption of anti-thiamine compounds found in raw, dried, and fermented fish (which is the food for poor southeast Asians). Thiamine deficiency is associated with significant lengthening of the QT interval of the ECG, low QRS voltage, and bradycardia. However, the QT interval is prolonged also in hypokalaemia (which is also widespread in southeast Asia) in addition to the physiological prolongation of QT interval which occurs during sleep due to changes in autonomic tone. The sudden death in persons prone to Bangungut syndrome occurs only in sleep.

Hence the five factors, deficient thiamine intake, consumption of anti-thiamine compounds, low potassium intake, hard physical work, and sleep are advanced to explain the Bangungut syndrome, which has hitherto been an unresolved medical puzzle.

Acknowledgement
The authors want to thank Mrs Paz Duplon of Cawayan, Botolan, Zambales, the Philippines for providing many anthropological and historical data regarding Bangungut syndrome. Many thanks also to Mrs Priscilla Garcia Jimenez and Mrs Clarita Mababa Galima the medical-technologists of the Regional Laboratory and Blood Bank of Dammam, for their technical help during preparation of this paper.

References