ORIGINAL ARTICLE

Is Maternal Depression a Risk Factor for Malnutrition Among Malay Children? A Case-Control Study in Selangor, Malaysia

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ABSTRACT

Introduction: A significant body of evidence highlights the association between maternal depression and malnutrition among young children in industrialised countries. However, studies in developing countries, including Malaysia, remain scarce. This case-control study aims to determine the association between maternal depression and malnourished children among young children in the rural community. **Methods:** Participants were malnourished (cases: n = 62) and well-nourished (controls: n = 62) children that was referred to all governmental health clinics in the Kuala Langat district, Selangor. Cases were matched with controls by age, gender, socioeconomic status and residential area. The existence of current maternal depression was evaluated using the validated Malay translated version of the Beck Depression Inventory Second Edition, and its association with undernourished children was expressed as odds ratios.**Results:** Binary logistic regression analysis shows that current maternal depression was associated with the risk of malnutrition in children (OR 2.2, 95% CI 1.03 – 4.61). Mothers who experienced depression were 2.2 times more likely to have malnourished children. **Conclusion:** Current maternal depression is a single risk factor for malnutrition among young children in this studied community. Upon a preliminary screening to detect symptoms of depression, preventive measures should be implemented at the early stage of pregnancy. Advice on optimising mothers' mental health should be integrated as part of prenatal and postnatal care to remove of minimize the detrimental effect in children's growth and development.

Keywords: Malnutrition, Maternal depression, Underweight, Young children.

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INTRODUCTION

Despite improvements in healthcare, malnutrition especially undernutrition among children, remains a major public health concern throughout the world (1). Undernourished children are often associated with lower cognitive ability (9), chronic diseases (5) and impaired immune system (6), thereby rendering them highly susceptible infections. Therefore, concerted efforts at combatting this prevailing medical condition are necessary. In general, insufficient nutrient intake and diseases (2), as well as inappropriate knowledge on nutrition among mothers (3) have been reported as risk factors for undernourished children.

Referring to statistics from 89 countries, an approximately 385 million children reside in extremely underprivileged households in 2013 (4). Children residing in intense poverty lack sufficient care and face extended health risks (6) particularly due to the fact that poverty is strongly associated with malnutrition, poor sanitation and hygiene, low maternal education, maternal stress and depression, and insufficient stimulation at home (5,7).

In a country with enough food supply, all segments of society should have adequate nutrition. However, undernutrition remains high in Malaysia, even as rates of undernourishment or hunger have improved since Independence. The National Health and Morbidity Survey (NHMS) 2016 on child health revealed that 13.7% of children younger than five years were underweight, 20.7% reported to be stunted while the remaining 11.5% were wasted than the average of their

peers. Comparing with the previous findings of the National Health and Morbidity Survey in 2006 (33), it was discovered that children aged one to three years were vulnerable to undernutrition. The highest rate of underweight and stunting were seen in this age group compared to infants and older children. However, the latest NHMS 2016 findings captured an interesting distribution of the above conditions. By age group, the highest cases of underweight were found among children aged 6 to 11 months (17.3%). Meanwhile, for stunting, the highest prevalence was detected among those children aged 24 to 35 months at 23.5%. As for wasting, national prevalence recorded the highest percentage among children aged under 5 months.

Concerning the findings from previous studies, maternal mental health was identified as a critically enabler of mothers to provide nutritious food and parenting care to their child. The first five years of child's life are critical to achieving healthy development guided with predictable milestones to reach their maximum potential growth. Simultaneously, it is a vulnerable phase for mothers to be exposed to a series of physically, mentally and socially adverse conditions. Worldwide, depression was listed at the top five ranks of disabling factors (9). Recent evidence (35) highlighted that the national prevalence of depression among Malaysian adults was 2.3% accounting approximately for half a million of the Malaysia population. By sociodemographic groups, females reported a higher percentage of depression (2.6%) as compared to males (2.0%). Alarmingly, this finding was consistent with (10) reported women who were two times more likely to have depression than men, with the percentages of maternal depression observed among mothers in Asian countries ranging between 3.5 to 63.3% (11). A similar finding was concluded by (36) in his review paper that women with a low socio-economic background experience more depression higher than men. Given the high prevalence of maternal depression was reported in developing countries (24), a considerable influence of maternal mental health on the growth pattern of children in this region could not be ruled out.

While neither the mechanism for explaining the association between maternal depression and child growth nor its consistency across varying countries and regions has been reported, it is advocated that differences in caregiving and feeding status as well as food insecurity, may have specific roles (21). While a review of the literature does not reveal a specific study that has focused on maternal depression and its association with child growth in Malaysia, the data available pertaining to Southeast Asian populations remains limited only to Bangladesh (37) and Vietnam (23).

Previous studies have found an association between maternal depression and child malnutrition, but it is not known whether an association exists in developing countries such as in Malaysia proving that there is a paucity of information on the above-mentioned association. Considering the temporal and spatial variations that might have taken place across the Southeast Asian region, performing specific studies to elucidate the current status of maternal depression and child growth appear relevant. Hence, this present research aimed at studying the association between maternal depression and malnourished children (below five years old) in Selangor, Malaysia may prove useful for expanding the current body of knowledge.

MATERIALS AND METHODS

Study design and population

This case-control study was conducted in Kuala Langat, a rural district located in the southwestern part of Selangor, a developed state within peninsular Malaysia and located approximately 40 km from the state capital (Shah Alam). It covered an area of 885 square kilometres and had a population of 222,261 that were distributed across its nine territorial parishes. Kuala Langat, Selangor had the highest percentage of malnourished children (31).

For enabling suitable comparison, the age and gender of each child, as well as the socioeconomic status of parents and residential area for the case group were matched with that of controls. While the current body weight, height, mid-upper arm circumference and head circumference of the children were measured to the nearest decimal point, respective mothers were evaluated for the existence of depression symptoms using the Malay translated version of the Beck Depression Inventory Second Edition (BDI II), validated by (18). To exclude inter-observer errors, the mothers were interviewed by the same interviewer in their local language.

Sample size and sampling method

Upon estimating the sample size using the table prescribed by previous researchers (20), (allowing for 10% of dropouts), a total of 62 malnourished children (cases) referred to the eight governmental health clinics in Kuala Langat district were randomly selected. Similarly, another set of 62 well-nourished children from the same district was included as controls, bringing the total number of children evaluated to 124. Following the growth chart and classification for children prescribed by the World Health Organization (17), the children recruited in this present research were categorised based on the anthropometric status detailed below. While children with weight-for-age and height-for-age lower than -2SD were considered underweight and stunted, respectively, wasted ones were defined as those with BMI-for-age lower than -2SD. In this present research, children whom classified as underweight, stunted and

wasted, as well as those having any combinations of such categories were included in the case group. On the other hand, children with weight, height and BMI-for-age between -2SD and +2SD were recruited as controls. The inclusion and exclusion criteria for recruiting mothers in the case and control group were as follows:

Inclusion criteria

Case
1. Malaysian (≥ 18 years old)
2. Malay mothers
3. Mother is literate and is able to understand the Malay language in order to answer the questionnaire.
4. Having at least one diagnosed undernourished child (aged six months to five years old)
5. Mother with a child born with a birth weight ≥2.5kg
6. Mother with no co-morbid mental and physical disabilities as well as medical illnesses or having a history of experiencing such conditions.

Control
1. Malaysian (≥ 18 years old)
2. Malay mothers
3. Mother is literate and is able to understand the Malay language in order to answer the questionnaire.
4. Healthy well-nourished children (aged six months to five years old)
5. Mother with a child born with birth weight ≥2.5kg
6. Mother with no co-morbid mental and physical disabilities as well as medical illnesses or having a history of experiencing such conditions.

Exclusion criteria

1. Illiterate Malay mother
2. Malay mother with undernourished child (aged six months to five years old) with hypertension and/or mental illnesses.
3. Malay mother with a child with congenital disease.

Because there was an association between uncontrolled hypertension and depression (38), mothers with hypertension and/or mental illnesses, and/or having a history of experiencing such conditions has been excluded from this present research.

Assessment of maternal depression

The Malay translated and validated BDI II tool (0.89 internal consistencies) (18) was used to interview all respective mothers for assessing maternal depression. The tool consisted of 21 items that represented the 21 different symptoms of depression using a 4-point scale (0-3) of increasing intensity order. The symptoms were: sadness, pessimism, past of failure, loss of pleasure, guilty feelings, punishment feelings, self-dislike, self-criticalness, suicidal thought or wishes, crying, agitation, loss of interest, indecisiveness, worthlessness, loss of energy, changes in sleeping pattern, irritability, changes in appetite, concentration difficulty, tiredness or fatigue and loss of interest in sex. All the mothers were requested to respond to each symptom's appropriate statement to reflect their emotional state over the past two weeks. The BDI II assessment score was obtained by summing up the values indicated for each symptom. While the BDI II score of ≥14 would indicate mental depression state, values of < 14 represent that such depression was not detected (19).

Statistical Analysis

Data were analysed using SPSS version 18.0 for Windows (SPSS Chicago, IL, USA). The normality of the data was assessed using Kolmogorov-Smirnov test. Considering that the data were normally distributed, an independent sample t-test was used to compare the significant differences between the cases and controls. The variables compared were: birth weight, current weight, current height, mid-upper arm circumference, head circumference and head circumference. Variables (viz. number of children aged below five, mothers' education level, working and depression status as well as the household income) were analysed using Binary logistic regression test for studying the association between maternal depression and malnourished children, and the data were presented as Odds ratios (OR). For determining significant differences, a level of significance of 0.05 was used.

Ethical consideration

Ethical clearance (NMRR-20-8185) was obtained from the Medical Research and Ethics Committee (MREC) of the Ministry of Health Malaysia prior to commencing the present research. An Information Sheet about the study was given to all subjects and informed consent was obtained from each subject before participating in the study. The questionnaires were numbered anonymously based on registration to protect the confidentiality of data.

RESULTS

We recruited 124 mothers in this study. Table 1 presents the anthropometric measurements of children for the case and control group. The mean (SD) of birth weight was 2.9kg (0.32kg) ($p<0.001$), current body weight was 9.7kg (1.71kg) ($p = 0.002$) and mid-upper arm circumference was 14.3cm (1.81cm) ($p = 0.003$) were found significantly lower in the case as compared to the control group. The majority of mothers in the case and control group received education less than 11 years and up to secondary school level (Table II). In addition, more than half of mothers in both groups were housewives

and had monthly household income of more than RM 1500. Significantly, more mothers (45.2%) in the case group were categorized as depressed compared with mothers in the control group (27.4%), p = 0.04 (Table II).

Binary logistic regression analysis shows that the current maternal depression was a significant risk factor to malnutrition (OR 2.2, 95% CI 1.03 – 4.61). Mothers who experienced depression were 2.2 times more likely to have malnourished children. However, factors such as number of children below five years (OR 0.92, 95% CI 0.29 – 2.93), years of mothers' education (OR 1.3, 95% CI 0.5 – 3.15), working status of mothers (OR 1.1, 95% CI 0.5-2.37) and household income (OR 1.6, 95% CI 0.78 – 3.42) were not significant risk factors of malnutrition among the children in this study.

Table I: Anthropometric measurements of children in the case and control group

Anthropometric measurement of children	Cases n=62 Mean (±SD)	Controls n=62 Mean (±SD)	p values
Birth weight (kg)	2.9±0.32	3.2±0.38	< 0.001
Current weight (kg)	9.7±1.71	10.6±1.55	0.002
Current height (cm)	85.6±9.16	83.3±6.91	0.107
Mid-upper arm circumference (cm)	14.3±1.81	15.1±1.41	0.004
Head Circumference (cm)	46.1±2.08	46.6±1.6	0.171

DISCUSSION

This paper has provided further evidence that maternal depression is prevalent and a single risk factor for malnutrition among young children in clinical settings in Kuala Langat. Depressed mothers doubled the risk of having malnourished child. This matches well with the latest findings from the National Health and Morbidity Survey 2019 which demonstrated that depression was higher in rural areas (3.6%) compared to urban areas (1.9%) This finding differs significantly from a previous national survey (39) which found that depression was high in urban areas. This finding is consistent with 17 meta-analysis studies showing the children of depressed mothers were at an increased risk of both underweight and stunting with an OR of approximately 1.4 (21). Another study on 144 children aged 6 to 12 month in South India reported that the presence of current maternal depression greatly increased the risk of malnutrition in the child (22). Higher odds of maternal depression were also detected among mothers of malnourished children in clinical settings in Kuala Langat in other studies in India and Vietnam (23).

Our findings from clinical settings are congruent with a hospital-based study among 100 Pakistani children

Table II: Risk factors associated with malnutrition among cases

Parameters	Binary Logistic Regression				
	Adjusted OR	95% CI		p-value	OR
		Lower	Upper		
No. of children below five years					
1 - 2	0	0.29	2.93	0.89	0.92
> 2	1				
Mothers education (years)					
<11 Having SPM or equivalent qualification	1	0.5	3.15	0.638	1.3
≥ 12 Having SPM with tertiary qualification	0				
Working status (mother)					
Housewife	0	0.5	2.37	0.842	1.1
Working	1				
Household income (RM)					
<1500	1	0.78	3.42	0.191	1.6
≥ 1500	0				
Maternal depression status					
Non-depressed	0	1.03	4.61	0.04	2.2
Depressed	1				

Abbreviations: OR, odds ratio; CI, confidence interval; AOR, adjusted odds ratio

of low socio-economic status (40) which reported that depressed mothers were prevalent. Earlier studies (41, 30, 22) also confirmed a strong association between maternal depression and poor weight gain. The aetiology of maternal depression is multi-factorial and complex due to poverty, marital conflict, domestic violence and lack of control over economic resources (24). Regardless of the mentioned causes, maternal depression consequently exert a significant negative impact on the health of both the mother and child (26). Nevertheless, the causes contributing to maternal depression were not studied in this present research.

In most societies, mothers are the front-line health care providers of nutrition to young children. It is a challenging task requiring good mental health. Poor mental health may contribute to unfavourable consequences to their children's health and well-being. Child growth is one of the most sensitive key indicators of child health and nutritional status. Maternal depression is well understood as a diminishing maternal interest in child rearing, reducing attention to a child's needs (27) and impairs parenting (28). The effect of maternal depression renders mothers unable to take care and provide nutritious food to their children efficiently. For instance, maternal depression in postnatal periods may reduce child survival (29).

Our case-control study witnesses two serious conditions the mother and child are facing. Mothers with depression struggled to provide overall childcare while the child needs to confront their depressed mother while demanding their rights to be provided with a healthy balanced meal for their growth. This situation warrants urgent attention to eliminating maternal depression to ensure the child is attended with proper parental care.

The current programs in Mothers and Child Health Clinics provide breastfeeding counselling, complementary feeding advice, antenatal and postnatal health care education intended for mothers (30). However, the current programs do not evaluate mothers' level of functional capacity, receptivity and abilities to absorb and practice intervention, all of which will be influenced by a mother's mental health.

It has been forecasted that child growth retardation can be reduced by up to 35% by reducing the prevalence of maternal depression in a developing country (32). Depressed mothers are vulnerable and require emotional support to empower them to carry out caregiving activities. Thus, a mother's pre-qualified mental health status is significantly important for programmes to achieve the desired nutritional status and support children's healthy growth.

Maternal depression shall be assessed and treated if required in parallel with nutritional intervention for malnourished children. In the preliminary screening to detect symptoms of depression, preventive measures should be implemented at the early stage of pregnancy. Advice on optimizing mothers' mental health should be integrated as part of prenatal and postnatal care to prohibit the detrimental effects in children's growth and development. Furthermore, it is strongly recommended to integrate mental health program into primary care to accelerate the Sustainable Development Goals progress, outlined by the United Nation.

The study was conducted in rural area government clinics among Malays given that malnutrition among Malay children in rural areas is more prevalent. The findings of this study may only represent mothers from rural Malay communities with children below five years. The study was conducted in such a way to minimize several potential biases. Only one interviewer conducted this study which prevents interviewer bias. The case and control subjects were strictly chosen from the same residence to avoid geographical bias. Only mothers choosing government clinics and not private health care were studied.

CONCLUSION

This study's findings indicate maternal depression is a risk factor of malnutrition among Malay children in the study group. In other words, these findings could not be generalized to all mothers. In-depth research which includes other population should be carried out to address this issue. It is also important to note that a mother's depression could also be caused by her malnourished child. Both maternal depression and malnutrition could contribute to each other in vicious cycle effect. Maternal mental health should be assessed during prenatal, postnatal and routine medical check-ups and depressed mothers should be referred to a psychiatrist for further treatment.

Treating mental illness in mothers offers vital opportunities to tackle the twin scourges of mental ill-health and child malnutrition. Further research is needed to investigate the causes of maternal depression and the impact of intervention in treating maternal depression in improving children's nutritional status.

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