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Original Article

Internal Medicine Section

# Children's Physical Activity Awareness among Mothers in a Saudi Arabian Health Center

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## ABSTRACT

**Introduction:** Physical inactivity is a major contributor to the increasing levels of obesity and other serious medical conditions among children and adolescents worldwide. A major factor in this increase is lack of awareness of mothers' regarding the Physical Activity (PA) of their children.

**Aim:** The current study aimed to identify the degree of knowledge and awareness of Saudi mothers' regarding their children's physical activities, which will be useful for improving physical education, health programs, and eventually children's health care.

**Materials and Methods:** A total of 342 mothers attending a vaccination clinic, well-baby, or women's health clinic participated in the study, in which questionnaire was used to assess the awareness regarding PA.

**Results:** The majority of mothers agreed that they have a crucial role in motivating their children to engage in PA, but was not aware of current recommendations.

**Conclusion:** Awareness of Saudi mothers' regarding their children's PA was exceedingly low. Creating awareness of children's PA is essential.


**Keywords:** Awareness, Physical activity, Saudi mothers, Vaccination clinic

## INTRODUCTION

Towards the end of the 20th century, obesity was recognized as a major health problem influencing the welfare of the global population [1]. While it was formerly recognized as only an adult health problem, obesity among children is rapidly becoming a major concern [2-4]. In 2013, the estimated number of overweight children below age five was 42 million globally [3-5]. Almost 31 million of these overweight children were living in developing countries [5]. Saudi Arabia is no exception; several studies in different areas and provinces have revealed a high incidence of overweight and obesity in Saudi children of all age groups [6-8]. It is likely that overweight preschool children will continue being overweight as they progress to school age [9], adolescence, and adulthood, with all the commonly associated health complications [10-12]. The risk of adult obesity is at least twice as high for obese children as for non-obese children [13]. Physical inactivity is widely documented as a major risk factor for many chronic diseases; it ranks between the second and sixth most important risk factor contributing to the burden of disease in Western populations [14-16]. Furthermore, its incidence is higher than that of all other modifiable risk factors [16]. Childhood is also an important time in the development of healthy lifestyle patterns and habits. For example, students who do systematic and routine physical activity demonstrate better academic performance and are able to devote attention to tasks for longer periods. Overall, consistent physical activity appears to promote healthier and longer life among children [17-19]. In recent years, Saudi Arabia has experienced rapid sociocultural changes due to the dramatic growth of the economy in the Arab Gulf region. This process of industrialization and modernization has in turn led to a remarkable increase in living standards and acceptance of a Westernized lifestyle, characterized by unhealthy dietary patterns (e.g., increased intake of energy-dense foods that are high in fat and sugars but low in vitamins, minerals, and other healthy micronutrients) and reduced physical activity, even among young children [4,5,20-22]. This reflects a general trend, in which, over the last few decades, the nature of children's recreational activities has changed considerably [20,23,24]. The influence of these lifestyle modifications on societal health is considerable; they are thought to underlie the epidemic of various non-communicable diseases and their complications in Saudi Arabia [22,25]. One of the most important strategies for achieving positive health outcomes for Saudi children is promoting regular physical activity. A number of factors may influence children's opportunity to participate in physical activity [26,27], one of which is mothers' awareness [26,28]. However, to our knowledge, no researchers have studied Saudi mothers' awareness of their children's physical activity. Therefore, we aimed to identify the degree of knowledge and awareness in Saudi mothers regarding their children's physical activities which will be useful for improving physical education, health programs, and eventually children's health care.

## MATERIALS AND METHODS

This was as a cross-sectional, descriptive study. Participants were mothers who had attended the vaccination clinic, well-baby, or woman's health clinic at Wazarat Health Centre in Prince Sultan Military Medical City, Riyadh, Saudi Arabia, who had at least one child more than two years of age. Additional inclusion criteria included being of a Saudi nationality and being able to read and write in Arabic. All data collection took place between January 1, 2014 and December 31, 2014. We calculated the sample size based on estimating the awareness of children's physical activity among mothers from a pilot study conducted by authors (unpublished). Specifically, anticipating an awareness of 20% with an absolute precision of ±5% and a confidence level of 95%, the minimum sample size required for the study was 246. Overall, we administered 350 questionnaires to account for potential dropouts.

The independent variables included mother's age, number of children, marital status, level of education, and employment status. In contrast, the dependent variable was mother's awareness of physical activity based on recommendations and guidelines.

Due to the lack of gold standard questionnaires for assessing mothers' awareness of physical fitness, we created a new questionnaire based on past literature and discussions with the research supervisor. The questionnaire was then given to three

experts, who were professors for evaluation of its content and face validity, and then subjected to a test-retest procedure in a pilot study to assess the reliability.

In addition, a pilot study was conducted (n=10) to assess the suitability and acceptability of the questionnaire. The pilot study also helped determine whether participants truly understood the meaning of each item and identify ways to improve the questionnaire. The final validated questionnaire was adjusted based on the pilot study results before being used in this study.

The questionnaire items were selected from various sources and compiled into a single form. The awareness items were based on the recommendations of the American Heart Association, American Stroke Association, and UK physical activity guidelines [29]. We used three items to identify mothers' awareness. If a mother answered one, two, or all three of the items correctly, she was considered to have low, moderate, and high awareness, respectively those who answered all three questions incorrectly were considered to have very low awareness.

Ethical approval was obtained from the Research Ethics Committee at Prince Sultan Military Medical City. We also received approval from the person in charge at the Wazarat Health Centre before distributing questionnaires to participants.

Participation was voluntary; participants had the right to withdraw at any time, without mentioning the reasons, and were free to not answer any question. We obtained participants' consent before they answered the questionnaire and kept all information confidential. The completed surveys were stored in a password-protected suitcase after research team members collected the data. The hard copies of the surveys remained locked up until all of the data had been analyzed and the results published, after which they were shredded. Furthermore, all stored study information was deleted after completion of the study.

## STATISTICAL ANALYSIS

Data analysis was carried out using Microsoft Excel 2013 (Microsoft Corporation, Seattle, WA, USA) and IBM SPSS Statistics 22 (IBM Corp., Armonk, NY). Mothers' data were entered into a computer, using Microsoft Excel on a regular basis, as they were collected. After completing data entry, we cleaned and checked the data for errors. Beyond the descriptive analysis, we performed a chi-square test to identify which variables were associated with awareness of children's physical activity. A p-value of <0.05 was considered significant.

## RESULTS

Of the 350 questionnaires distributed at the Wazarat Health Centre, 342 were collected (response rate 98%). The demographics of the sample are shown in [Table/Fig-1]. The mothers' mean±SD age was 35.2±3.6 years, with the majority being in the 31–40 age group (n = 137; 40.1%). Almost 80% of participants were housewives and most had four or less children; only 39 mothers had more than five children. Mostly, 194 (56.7%) of the mothers had completed secondary school.

[Table/Fig-2] show the mothers' responses concerning how crucial their role was in motivating and improving children's physical activity. Most mothers 252 (73.7%) agreed that they had a crucial role in motivating and improving their children's physical activity. By age group, most mothers in the 20–30 age group 67 (80.7%) and > 50 age group 9 (90%) showed such agreement. Furthermore, compared to elementary school 11 (39.3%) and intermediate school 9 (53%) educated mothers, the highest rates of agreement were found in secondary school educated 142 (73.2%) and college educated 90 (87.4%) mothers. We observed no notable differences between employed mothers and housewives.

[Table/Fig-3] illustrate the mothers' knowledge of current recommendations regarding physical exercise for children. The majority of mothers

| Variable | | n | % | Total |
|---|---|---|---|---|
| Age, years | <20 | 39 | 11.4 | 342 |
| | 20–30 | 83 | 24.3 | |
| | 31–40 | 137 | 40.1 | |
| | 41–50 | 73 | 21.3 | |
| | >50 | 10 | 2.9 | |
| Number of children | 1–3 | 214 | 62.6 | 342 |
| | 4–5 | 89 | 26 | |
| | > 5 | 39 | 11.4 | |
| Marital status | Married | 319 | 93.3 | 342 |
| | Divorced | 13 | 3.8 | |
| | Widowed | 10 | 2.9 | |
| Educational level | Elementary | 28 | 8.2 | 342 |
| | Intermediate | 17 | 5 | |
| | Secondary | 194 | 56.7 | |
| | College | 103 | 30.1 | |
| | Higher | 0 | 0 | |
| Employment | Working | 69 | 20.2 | 342 |
| | Housewife | 273 | 79.8 | |

**[Table/Fig-1]:** Sociodemographic characteristics of mothers in the study.

| Variable | | No | | Yes | | Total |
|---|---|---|---|---|---|---|
| | | n | % | n | % | |
| Age, years | <20 | 13 | 33.3 | 26 | 66.7 | 39 |
| | 20–30 | 16 | 19.3 | 67 | 80.7 | 83 |
| | 31–40 | 39 | 28.5 | 98 | 71.5 | 137 |
| | 41–50 | 21 | 28.8 | 52 | 71.2 | 73 |
| | >50 | 1 | 10 | 9 | 90 | 10 |
| Total | | 90 | 26.3 | 252 | 73.7 | 342 |
| Number of children | 1–3 | 54 | 25.2 | 160 | 74.8 | 214 |
| | 4-5 | 20 | 22.5 | 69 | 75.5 | 89 |
| | >5 | 16 | 41 | 23 | 59 | 39 |
| Total | | 90 | 26.3 | 252 | 73.7 | 342 |
| Marital status | Married | 85 | 26.6 | 234 | 73.4 | 319 |
| | Divorced | 2 | 15.4 | 11 | 84.6 | 13 |
| | Widowed | 3 | 30 | 7 | 70 | 10 |
| Total | | 90 | 26.3 | 252 | 73.7 | 342 |
| Educational level | Elementary | 17 | 60.7 | 11 | 39.3 | 28 |
| | Intermediate | 8 | 47 | 9 | 53 | 17 |
| | Secondary | 52 | 26.8 | 142 | 73.2 | 194 |
| | College | 13 | 12.6 | 90 | 87.4 | 103 |
| Total | | 90 | 26.3 | 252 | 73.7 | 342 |
| Employment | Working | 15 | 21.7 | 54 | 78.3 | 69 |
| | Housewife | 75 | 27.5 | 198 | 72.5 | 273 |
| Total | | 90 | 26.3 | 252 | 73.7 | 342 |

**[Table/Fig-2]:** Mothers' opinions of the importance of their role in motivating and improving their children's physical activity.

| Variable | | No | | Yes | | Total |
|---|---|---|---|---|---|---|
| | | n | % | n | % | |
| Age, years | <20 | 34 | 87.2 | 5 | 12.8 | 39 |
| | 20–30 | 70 | 84.3 | 13 | 15.6 | 83 |
| | 31–40 | 120 | 87.6 | 17 | 12.4 | 137 |
| | 41–50 | 59 | 80.2 | 14 | 19.2 | 73 |
| | >50 | 8 | 80 | 2 | 20 | 10 |
| Total | | 291 | 85.1 | 51 | 14.9 | 342 |
| Number of children | 1–3 | 179 | 83.6 | 35 | 16.4 | 214 |
| | 4–5 | 78 | 87.6 | 11 | 12.4 | 89 |
| | > 5 | 34 | 87.2 | 5 | 12.8 | 39 |
| Total | | 291 | 85.1 | 51 | 14.9 | 342 |
| Marital status | Married | 275 | 86.2 | 44 | 13.8 | 319 |
| | Divorced | 11 | 84.6 | 2 | 15.4 | 13 |
| | Widow | 5 | 50 | 5 | 50 | 10 |
| Total | | 291 | 85.1 | 51 | 14.9 | 342 |
| Educational level | Elementary | 22 | 78.6 | 6 | 21.4 | 28 |
| | Intermediate | 13 | 76.5 | 4 | 23.5 | 17 |
| | Secondary | 166 | 85.6 | 28 | 14.4 | 194 |
| | College | 90 | 87.4 | 13 | 12.6 | 103 |
| Total | | 291 | 85.1 | 51 | 14.9 | 342 |
| Employment | Working | 60 | 87 | 9 | 13 | 69 |
| | Housewife | 231 | 84.6 | 42 | 15.4 | 273 |
| Total | | 291 | 85.1 | 51 | 14.9 | 342 |

**[Table/Fig-3]:** Mothers' knowledge of current recommendations regarding physical activity in children by demographic characteristic.

291 (85.1%) reported not knowing about any of the current recommendations. There were no notable differences by demographic variables.

[Table/Fig-4] illustrates the mothers' opinions about their children's participation in regular exercise suitable for their age, gender, and stage of physical-emotional development. We found that 316 (92.4%) of mothers agreed (i.e., answered yes) that children should participate in regular exercise suitable to their developmental stage; this was highest among the 41–80 age group. Furthermore, when compared to college-educated mothers 102 (99.03%), slightly fewer positive answers were found among secondary 185 (95.4%), intermediate 15 (88.2%), and elementary educated mothers 14 (50%).

[Table/Fig-5] illustrates the mothers' opinion about how many minutes of television are recommended for children. Notably, most mothers 24 (28.9%) stated that 30–60 minutes was recommended, while 64 (18.7%) mothers stated that >60 minutes was an appropriate amount of time. Similar trends were observed among college and secondary educated mothers. No major differences were observed according to the other demographic variables.

| Variable | | No | | Yes | | Total |
|---|---|---|---|---|---|---|
| | | n | % | n | % | |
| Age, years | <20 | 5 | 12.8 | 34 | 87.2 | 39 |
| | 20–30 | 9 | 10.8 | 74 | 89.2 | 83 |
| | 31–40 | 8 | 5.8 | 129 | 94.2 | 137 |
| | 41–50 | 4 | 5.5 | 69 | 94.5 | 73 |
| | >50 | 0 | 0 | 10 | 100 | 10 |
| Total | | 26 | 7.6 | 316 | 92.4 | 342 |
| Number of children | 1–3 | 7 | 3.3 | 207 | 96.7 | 214 |
| | 4–5 | 11 | 12.4 | 78 | 87.6 | 89 |
| | > 5 | 8 | 20.5 | 31 | 79.5 | 39 |
| Total | | 26 | 7.6 | 316 | 92.4 | 342 |
| Marital status | Married | 26 | 8.1 | 293 | 91.9 | 319 |
| | Divorced | 0 | 0 | 13 | 100 | 13 |
| | Widowed | 0 | 0 | 10 | 100 | 10 |
| Total | | 26 | 7.6 | 316 | 92.4 | 342 |
| Educational level | Elementary | 14 | 50 | 14 | 50 | 28 |
| | Intermediate | 2 | 11.8 | 15 | 88.2 | 17 |
| | Secondary | 9 | 4.6 | 185 | 95.4 | 194 |
| Total | College | 1 | 0.97 | 102 | 99.03 | 103 |
| | | 26 | 7.6 | 316 | 92.4 | 342 |
| Employment | Working | 4 | 5.8 | 65 | 94.2 | 69 |
| | Housewife | 22 | 8.1 | 251 | 91.9 | 273 |
| Total | | 26 | 7.6 | 316 | 92.4 | 342 |

**[Table/Fig-4]:** Mothers' opinions on the importance of children's participation in regular exercise suitable to their age, gender, and stage of physical and emotional development.

[Table/Fig-6] shows the mothers' awareness of how frequently any child above two years of age should participate in physical exercise, which is developmentally appropriate for his/her age. Compared to answers of once a week, twice a week, and three times per week, more mothers answered every day, across all the sociodemographic groups. There were no differences within each variable.

[Table/Fig-7] demonstrates the mothers' awareness of how often children should participate in physical exercise. Very few mothers (only 86 out of 342) answered correctly. Similar results were found across all age groups and across other variables, without any significant differences.

[Table/Fig-8] illustrates the mothers' awareness of how children who have been physically inactive can begin to engage in regular physical exercise. Only 62 out of the 342 answered correctly. Similarly, low

| Sociodemographic characteristics | Awareness | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Once per week | | Twice per week | | Three times per week | | Every day | | Don't know | | |
| | n | % | n | % | n | % | n | % | n | % | |
| Age in years | | | | | | | | | | | |
| <20 | 0 | 0 | 6 | 15.4 | 12 | 30.8 | 18 | 46.1 | 3 | 7.8 | 39 |
| 20–30 | 0 | 0 | 18 | 21.7 | 24 | 28.9 | 32 | 38.5 | 9 | 10.8 | 83 |
| 31–40 | 0 | 0 | 24 | 17.5 | 29 | 21.2 | 74 | 54 | 10 | 7.2 | 137 |
| 41–50 | 0 | 0 | 18 | 24.6 | 20 | 27.4 | 32 | 43.8 | 3 | 4.1 | 73 |
| >50 | 0 | 0 | 2 | 20 | 3 | 30 | 5 | 50 | 0 | 0 | 10 |
| Total | 0 | 0 | 68 | 19.9 | 88 | 25.7 | 161 | 47.1 | 25 | 7.3 | 342 |
| Number of children | | | | | | | | | | | |
| 1–3 | 0 | 0 | 44 | 20.6 | 59 | 27.6 | 101 | 47.2 | 10 | 4.7 | 214 |
| 4–5 | 0 | 0 | 21 | 23.6 | 23 | 25.8 | 36 | 40.4 | 9 | 10.1 | 89 |
| >5 | 0 | 0 | 3 | 7.7 | 6 | 15.4 | 24 | 61.5 | 6 | 15.4 | 39 |
| Total | 0 | 0 | 68 | 19.9 | 88 | 25.7 | 161 | 47.1 | 25 | 7.3 | 342 |
| Marital status | | | | | | | | | | | |
| Married | 0 | 0 | 63 | 19.7 | 83 | 26 | 150 | 47 | 23 | 7.2 | 319 |
| Divorced | 0 | 0 | 3 | 23 | 4 | 30.7 | 4 | 30.7 | 2 | 15.3 | 13 |
| Widowed | 0 | 0 | 2 | 20 | 1 | 10 | 7 | 70 | 0 | 0 | 10 |
| Total | 0 | 0 | 68 | 19.9 | 88 | 25.7 | 161 | 47.1 | 25 | 7.3 | 342 |
| Educational level | | | | | | | | | | | |
| Elementary | 0 | 0 | 6 | 21.4 | 3 | 10.7 | 10 | 35.7 | 9 | 32.1 | 28 |
| Intermediate | 0 | 0 | 5 | 29.4 | 0 | 0 | 12 | 70.6 | 0 | 0 | 17 |
| Secondary | 0 | 0 | 36 | 18.5 | 48 | 24.7 | 97 | 50 | 13 | 6.7 | 194 |
| College | 0 | 0 | 21 | 20.4 | 37 | 35.9 | 42 | 40.8 | 3 | 2.9 | 103 |
| Total | 0 | 0 | 68 | 19.9 | 88 | 25.7 | 161 | 47.1 | 25 | 7.3 | 342 |
| Employment | | | | | | | | | | | |
| Working | 0 | 0 | 9 | 13 | 22 | 31.9 | 36 | 52.2 | 2 | 2.9 | 69 |
| Housewife | 0 | 0 | 59 | 21.6 | 66 | 24.1 | 125 | 45.7 | 23 | 8.4 | 273 |
| Total | 0 | 0 | 68 | 19.9 | 88 | 25.7 | 161 | 47.1 | 25 | 7.3 | 342 |

**[Table/Fig-6]:** Mothers' awareness of how frequently any child aged over two years should participate in physical exercise developmentally appropriate for his/her age.

| Variable | | None | | < 30 minutes | | 30–60 minutes | | > 60 minutes | | Don't know | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | N | % | n | % | n | % | n | % | n | % | |
| Age, years | <20 | 5 | 12.8 | 8 | 20.5 | 11 | 28.2 | 4 | 10.3 | 11 | 28.2 | 39 |
| | 20–30 | 10 | 12 | 11 | 13.3 | 27 | 32.5 | 18 | 21.7 | 17 | 20.5 | 83 |
| | 31–40 | 26 | 19 | 25 | 18.2 | 28 | 20.4 | 26 | 19 | 32 | 23.3 | 137 |
| | 41–50 | 7 | 9.6 | 9 | 12.3 | 29 | 39.7 | 15 | 20.5 | 13 | 17.8 | 73 |
| | >50 | 2 | 20 | 0 | 0 | 4 | 40 | 1 | 10 | 3 | 30 | 10 |
| Total | | 50 | 14.6 | 53 | 15.5 | 99 | 28.9 | 64 | 18.7 | 76 | 22.2 | 342 |
| Number of children | 1–3 | 32 | 14.9 | 39 | 18.2 | 63 | 29.4 | 47 | 22 | 33 | 15.4 | 214 |
| | 4–5 | 13 | 14.6 | 10 | 11.2 | 27 | 30.3 | 12 | 13.5 | 27 | 30.3 | 89 |
| | > 5 | 5 | 12.8 | 4 | 10.3 | 9 | 23 | 5 | 12.8 | 16 | 41 | 39 |
| Total | | 50 | 14.6 | 53 | 15.5 | 99 | 28.9 | 64 | 18.7 | 76 | 22.2 | 342 |
| Marital status | Married | 47 | 14.7 | 47 | 14.7 | 98 | 30.7 | 60 | 18.8 | 67 | 21 | 319 |
| | Divorced | 3 | 23 | 4 | 30.7 | 0 | 0 | 2 | 15.3 | 4 | 30.7 | 13 |
| Total | Widow | 0 | 0 | 2 | 20 | 1 | 10 | 2 | 20 | 5 | 50 | 10 |
| | | 50 | 14.6 | 53 | 15.5 | 99 | 28.9 | 64 | 18.7 | 76 | 22.2 | 342 |
| Educational level | Elementary | 1 | 3.5 | 3 | 10.7 | 8 | 28.6 | 4 | 14.2 | 12 | 42.8 | 28 |
| | Intermediate | 1 | 5.8 | 5 | 29.4 | 4 | 23.5 | 3 | 17.6 | 4 | 23.5 | 17 |
| | Secondary | 34 | 17.5 | 22 | 11.3 | 61 | 31.4 | 33 | 17 | 44 | 22.7 | 194 |
| | College | 14 | 13.6 | 23 | 22.3 | 26 | 25.2 | 24 | 23.3 | 16 | 15.5 | 103 |
| Total | | 50 | 14.6 | 53 | 15.5 | 99 | 28.9 | 64 | 18.7 | 76 | 22.2 | 342 |
| Employment | Working | 7 | 10.1 | 16 | 23.1 | 22 | 31.8 | 11 | 15.9 | 13 | 18.8 | 69 |
| | Housewife | 43 | 15.7 | 37 | 13.5 | 77 | 28.2 | 53 | 19.4 | 63 | 23 | 273 |
| Total | | 50 | 14.6 | 53 | 15.5 | 99 | 28.9 | 64 | 18.7 | 76 | 22.2 | 342 |

**[Table/Fig-5]:** Mothers' opinions on the number of hours of watching television recommended for children.

| Socio-demographic characteristics | Knowledge | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| | At least 60 minutes per day | | 30 minutes five times per week | | Less than 20 minutes per day | | A total of 60 minutes per weak | | |
| | n | % | n | % | n | % | n | % | |
| Age in years | | | | | | | | | |
| <20 | 11 | 28.2 | 20 | 51.3 | 8 | 20.5 | 0 | 0 | 39 |
| 20–30 | 24 | 28.9 | 31 | 37.3 | 20 | 24.1 | 8 | 9.6 | 83 |
| 31–40 | 31 | 22.6 | 66 | 48.2 | 34 | 24.8 | 6 | 4.3 | 137 |
| 41–50 | 18 | 24.6 | 31 | 42.5 | 17 | 23.3 | 7 | 9.6 | 73 |
| >50 | 2 | 20 | 4 | 40 | 2 | 20 | 2 | 20 | 10 |
| Total | 86 | 25.1 | 152 | 44.4 | 81 | 23.7 | 23 | 6.7 | 342 |
| Number of children | | | | | | | | | |
| 1–3 | 52 | 24.3 | 95 | 44.4 | 52 | 24.3 | 15 | 7 | 214 |
| 4–5 | 17 | 19.1 | 43 | 48.3 | 23 | 25.8 | 6 | 6.7 | 89 |
| >5 | 17 | 43.6 | 14 | 35.9 | 6 | 15.4 | 2 | 5.1 | 39 |
| Total | 86 | 25.1 | 152 | 44.4 | 81 | 23.7 | 23 | 6.7 | 342 |
| Marital status | | | | | | | | | |
| Married | 82 | 25.7 | 140 | 43.9 | 76 | 23.8 | 21 | 6.6 | 319 |
| Divorced | 2 | 15.4 | 5 | 38.5 | 4 | 30.8 | 2 | 15.4 | 13 |
| Widow | 2 | 20 | 7 | 70 | 1 | 10 | 0 | 0 | 10 |
| Total | 86 | 25.1 | 152 | 44.4 | 81 | 23.7 | 23 | 6.7 | 342 |
| Educational level | | | | | | | | | |
| Elementary | 9 | 32.1 | 13 | 46.4 | 4 | 14.3 | 2 | 7.1 | 28 |
| Intermediate | 4 | 23.5 | 5 | 29.4 | 5 | 29.4 | 3 | 17.6 | 17 |
| Secondary | 49 | 25.2 | 87 | 44.8 | 45 | 23.2 | 13 | 6.7 | 194 |
| College | 24 | 23.3 | 47 | 45.6 | 27 | 26.2 | 5 | 4.8 | 103 |
| Total | 86 | 25.1 | 152 | 44.4 | 81 | 23.7 | 23 | 6.7 | 342 |
| Employment | | | | | | | | | |
| Working | 18 | 26 | 26 | 37.7 | 19 | 27.5 | 6 | 8.7 | 69 |
| Housewife | 68 | 24.9 | 126 | 46.1 | 62 | 22.7 | 17 | 6.2 | 273 |
| Total | 86 | 25.1 | 152 | 44.4 | 81 | 23.7 | 23 | 6.7 | 342 |

**[Table/Fig-7]:** Mothers' awareness of up to how many minutes should children participate in physical exercise.

| Sociodemographic characteristics | Knowledge | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | The same as active children but with an incremental approach to the daily requirement where inactivity is increased by 10% per week | | Start gradually to reach 30 minutes per week | | Start immediately at the same rate as active children to achieve rapid results | | |
| | n | % | n | % | n | % | |
| Age in years | | | | | | | |
| <20 | 6 | 15.4 | 8 | 20.5 | 25 | 64.1 | 39 |
| 20–30 | 20 | 24 | 15 | 18 | 48 | 57.8 | 83 |
| 31–40 | 23 | 16.8 | 18 | 13.1 | 96 | 70 | 137 |
| 41–50 | 10 | 13.7 | 11 | 15 | 52 | 71.2 | 73 |
| >50 | 3 | 30 | 0 | 0 | 7 | 70 | 10 |
| Total | 62 | 18.1 | 52 | 15.2 | 28 | 66.7 | 342 |
| Number of children | | | | | | | |
| 1–3 | 35 | 16.3 | 26 | 12.1 | 153 | 71.5 | 214 |
| 4–5 | 23 | 25.8 | 16 | 17.8 | 50 | 56.2 | 89 |
| >5 | 4 | 10.2 | 10 | 25.6 | 25 | 64.1 | 39 |
| Total | 62 | 18.1 | 52 | 15.2 | 228 | 66.7 | 342 |
| Marital status | | | | | | | |
| Married | 57 | 17.9 | 49 | 15.4 | 213 | 66.8 | 319 |
| Divorced | 3 | 23.1 | 2 | 15.4 | 8 | 61.5 | 13 |
| Widow | 2 | 20 | 1 | 10 | 7 | 70 | 10 |
| Total | 62 | 18.1 | 52 | 15.2 | 228 | 66.7 | 342 |
| Educational level | | | | | | | |
| Elementary | 7 | 25 | 4 | 14.3 | 17 | 60.7 | 28 |
| Intermediate | 4 | 23.5 | 1 | 5.9 | 12 | 70.6 | 17 |
| Secondary | 31 | 16 | 31 | 16 | 132 | 60 | 194 |
| College | 20 | 19.4 | 16 | 15.5 | 67 | 65 | 103 |
| Total | 62 | 18.1 | 52 | 15.2 | 228 | 66.7 | 342 |
| Employment | | | | | | | |
| Working | 9 | 13 | 16 | 23.2 | 45 | 65.2 | 69 |
| Housewife | 53 | 19.4 | 37 | 13.5 | 183 | 67 | 273 |
| Total | 62 | 18.1 | 52 | 15.2 | 228 | 66.7 | 342 |

**[Table/Fig-8]:** Mothers' awareness of how children who have been physically inactive can begin a regular physical exercise program.

percentages of correct answers were found across age groups and across other variables, without any significant differences between groups for each variable.

| Sociodemographic characteristics | N (342) | Knowledge | | | | | | | | p |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Very Low | | Low | | Moderate | | Good | | |
| | | n (119) | % 34.8 | n (144) | % 42.1 | n (72) | % 21.1 | n (7) | % 2 | |
| Age in years | | | | | | | | | | |
| <20 | 39 | 13 | 33.3 | 18 | 46.1 | 7 | 17.9 | 1 | 2.6 | |
| 20–30 | 83 | 31 | 37.3 | 28 | 33.7 | 24 | 28.9 | 0 | 0 | |
| 31–40 | 137 | 44 | 32.1 | 62 | 45.2 | 27 | 19.7 | 4 | 2.9 | 0.446 |
| 41–50 | 73 | 28 | 38.3 | 31 | 42.5 | 13 | 17.8 | 1 | 1.4 | |
| >50 | 10 | 3 | 30 | 5 | 50 | 1 | 10 | 1 | 10 | |
| Number of children | | | | | | | | | | |
| 1–3 | 214 | 77 | 36 | 89 | 40.2 | 45 | 21 | 3 | 1.4 | |
| 4–5 | 89 | 35 | 39.3 | 35 | 39.3 | 16 | 18 | 3 | 3.4 | 0.290 |
| >5 | 39 | 7 | 18 | 20 | 51.3 | 11 | 28 | 1 | 2.6 | |
| Marital status | | | | | | | | | | |
| Married | 319 | 111 | 34.8 | 134 | 42 | 67 | 21 | 7 | 2.2 | |
| Divorced | 13 | 6 | 46.1 | 5 | 38.5 | 2 | 15.4 | 0 | 0 | 0.881 |
| Widow | 10 | 2 | 20 | 5 | 30 | 3 | 30 | 0 | 0 | |
| Educational level | | | | | | | | | | |
| Elementary | 28 | 11 | 39.2 | 10 | 35.7 | 5 | 17.9 | 2 | 7.1 | |
| Intermediate | 17 | 4 | 23.5 | 6 | 35.3 | 7 | 41.2 | 0 | 0 | 0.257 |
| Secondary | 194 | 67 | 34.5 | 82 | 42.3 | 40 | 20.6 | 5 | 2.6 | |
| College | 103 | 37 | 36 | 46 | 44.7 | 20 | 19.4 | 0 | 0 | |
| Employment | | | | | | | | | | |
| Working | 69 | 24 | 34.8 | 28 | 40.6 | 16 | 23.2 | 1 | 1.4 | 0.943 |
| Housewife | 273 | 95 | 34.8 | 116 | 42.5 | 56 | 20.6 | 6 | 2.2 | |

**[Table/Fig-9]:** Mothers' overall level of awareness of their children's physical activity.

[Table/Fig-9] illustrate the mothers' overall awareness of children's physical activity. We found that only 7 (2%) of mothers were fully aware of their children's physical activity. Furthermore, 119 (34.8%) of mothers had a very low level of awareness (i.e., answered all three questions wrong) about their children's physical activity, while 144 (42.1%) and 72 (21.1%) had low and moderate awareness (i.e., one or two correct answers), respectively. Unexpectedly, we observed no major differences between higher and lower educated mothers. Similarly, no major differences were observed between the other variables.

## DISCUSSION

Our primary objective was to assess Saudi mothers' awareness of their children's physical activity to determine whether such mothers would benefit from education on children's physical exercise and eventually improve their children's health. Mothers were aware of their own importance in changing their children's health behavior. More than 240 (70%) of mothers agreed that they have a crucial role in motivating their children to improve their physical activity. This agreement was especially high among younger mothers (20–30 years' age), at 274 (80%), and those who were highly educated (college education or higher), at 299 (87.4%). These results clearly show an association between mothers' education level and awareness of the proper physical activity for their children. Additionally, most participants strongly believed that children age two or more should participate in regular physical activity.

Mothers are generally the primary caregivers of their children, and thus tend to spend more time with them. That is likely why they have such a crucial role in encouraging their children's healthy and active lifestyle. Mothers' knowledge about healthy lifestyle is exceedingly important to their children, fulfilling this role. Unfortunately, our results indicate that very few Saudi mothers had an adequate degree of awareness regarding physical exercise recommendations for children.

Specifically, regarding mothers' awareness of how frequently children should participate in physical exercise, we found that 161 (47%) mothers reported that children need physical exercise every day. However, only 86 (25.1%) of mothers were aware that children should perform at least 60 minutes of physical exercise suitable to his/her age per day. This clearly shows that most mothers were aware of how often children should participate in physical exercise,

but few were aware of how long children must participate in their physical exercise in order to obtain its benefits. Similar to the latter result, only 62 (18.1%) of mothers correctly answered the question about how physically inactive children should start physical activity.

Overall, only 7 (2%) were fully aware of children's physical activity recommendations, while approximately one-third 119 (34.8%) had a very low level of awareness of their children's physical activity, followed by 144 (42.1%) having moderate awareness, and 72 (21.1%) having good awareness. Unexpectedly, there were no major differences in awareness between education levels among mothers. Similarly, no major differences were observed according to other variables, such as age, employment, and marital status.

Primary caregivers' knowledge of recommendations for children's physical activity has only been examined as a part of a small feasibility study of parents of Australian preschoolers [30]. This study noted that only 69 (20%) of parents were aware of physical activity guidelines for children. Similarly, in the present study, we found that the majority of mothers 291 (85.1%) had reported that they did not know about any current recommendations regarding physical exercise for children. Furthermore, no major differences were found between different demographic variable groups. These findings are also consistent with those of a previous pilot study from Australia, wherein 20% of 44 parents knew the Australian physical activity recommendations [30]. Unfortunately, we cannot make any effective comparisons with other studies in the same field because of the overall lack of similar research.

There are several possible explanations for mothers' lack of awareness of physical exercise recommendations. One possible explanation is that the physical activity guidelines disseminated by the Saudi Ministry of Health may not be reaching large sections of the population. Together with the possibility that most mothers incorrectly believe their child to be active [29], this lack of dissemination of the physical activity guidelines could be hampering efforts to improve childhood physical activity. Another possible cause of the low awareness might be the lack of education on the importance and life-changing effects of regular physical activity in children and how that can affect their health in the future.

Furthermore, in Saudi Arabia, there are no physical exercise classes in most public schools for girls. Thus, mothers may have lacked the opportunity to engage in regular physical exercise in their schools since childhood, which may lead them to be unaware of its importance for their children.

The American Heart Association recommends [31,32] that children and adolescents participate in at least 60 minutes of moderate to vigorous physical activity daily to reduce the incidence of numerous non-communicable diseases. The American Heart Association also states that physical activity can be increased by reducing the amount of sedentary time (e.g., watching television, playing computer video games, talking on the phone). If children do not have a full 60-minute free period for such physical activity daily, mothers might provide at least two 30-minute periods or four 15-minute periods, wherein students engage in vigorous activities appropriate to their age, gender, and stage of physical and emotional development. In this study, we found that only one-third of the mothers were aware of the recommended time allowed for children to spend in front of their television. Furthermore, 76 (22.1%) of mothers did not know that there were such recommendations. Thus, mothers' lack of awareness might be one of the causes of Saudi children's high degree of inactivity.

Given that physical activity produces overall physical, psychological, and social benefits [33], it may be necessary to increase the proportion of medical and healthcare workers who can counsel mothers on the importance of children's physical activity time period. Additionally, it is essential that both mothers and fathers be role models for active lifestyles and provide children with opportunities for increased physical activity.

### Implications For Practice

We recommend the following to help improve Saudi mothers' awareness of their children's physical activity and thereby improve children's health:

a) There is a strong need to improve mothers' awareness of current physical activity guidelines and recommendations for their children's physical activity;

b) A variety of physical activity choices for children should be given at home and school and they should be easily available and affordable;

c) Parents must be more aware of the expenses and socioeconomic and personal factors related to overweight and obesity;

d) More medical and healthcare workers are needed in order to counsel mothers about the importance of children's physical activity;

e) Health curriculums should be altered such that they devote adequate attention to physical activity and improve parents' awareness of physical activity benefits;

f) There is a need to improve individuals' awareness and knowledge of recommendations on the limits of television viewing and other recreational screen time among the population;

g) There is an association between mothers' education level and awareness of the proper physical activity for their children;

h) Mothers' overall awareness of their children's physical activity was very low. Only 2% of mothers were fully aware of their children's physical activity;

i) Very few Saudi mothers had an adequate degree of awareness regarding physical exercise recommendations for children.

## LIMITATION

The present study has some limitations. First, as this was a cross-sectional survey, only a limited amount of information could be obtained from participants compared to other types of studies (e.g., qualitative studies), where more in-depth information could be obtained. Second, we had a lack of time during data collection, which made it necessary to finish the study quickly. Third, and perhaps most importantly, the study was performed at a single center and only among mothers; thus, the findings cannot be generalized to other centers or to fathers. Our results would be more conclusive if both parents had been included and more variables were incorporated into the study. Therefore, more research with larger sample sizes may be needed to ensure the accuracy and address the limitations of the study.

## CONCLUSION

The results clearly illustrate that mothers are reasonably knowledgeable of how often children should participate in physical exercise, but lacked knowledge of how long children must participate in physical exercise to obtain benefits.

We found that mothers' overall awareness of their children's physical activity was very low. Only 7 (2%) of mothers were fully aware of their children's physical activity. These findings suggest that the Saudi government may have an important role in improving mothers' awareness of the importance of physical activity in their children and making sure that the recommendations and guidelines reach all members of the population.

Finally, in Saudi Arabia, there is a clear lack of published research on mothers' awareness of children's physical activity. Such research is essential for planning appropriate management programs and ensuring proper allocation of health resources in this area.

## ABBREVIATIONS

RMSEA- Root Mean Square Error of Approximation;

CFI- Comparative Fit Index;

GFI- Goodness-of-Fit Index;

SRMR- Standardized Root Mean Square Residual

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