Effectiveness of mHealth/eHealth interventions on Obesity treatment: a protocol for umbrella review of meta-analyses

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Complete List of Authors:	Lei, Xiang-Guo; Guangxi Medical University First Affiliated Hospital, Geriatrics Department of Endocrinology and Metabolism; Guangxi Medical University First Affiliated Hospital, Guangxi Clinical Research Center for Cardiocerebrovascular Diseases Huang, Zhongheng; Guangxi Medical University Rashi, Tamrakar; Guangxi Medical University First Affiliated Hospital, Geriatrics Department of Endocrinology and Metabolism; Guangxi Medical University First Affiliated Hospital, Guangxi Clinical Research Center for Cardiocerebrovascular Diseases Yang, Xi; Guangxi Medical University First Affiliated Hospital, Geriatrics Department of Endocrinology and Metabolism; Guangxi Medical University First Affiliated Hospital, Guangxi Clinical Research Center for Cardiocerebrovascular Diseases
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Effectiveness of mHealth/eHealth interventions on Obesity treatment: a protocol for umbrella review of meta-analyses

Xiang-Guo Lei[123], Zhongheng Huang[4], Tamrakar Rashi[123], Xi Yang[123]

[1]Geriatrics Department of Endocrinology and Metabolism, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China.

[2]Guangxi Clinical Research Center for Cardiocerebrovascular Diseases, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China

[3]Guangxi Key Laboratory of Precision Medicine in Cardio cerebrovascular Diseases Control and Prevention, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China

[4]Guangxi Medical University

Correspondence to

Xi Yang;

yangxicc2008@sina.cn

ABSTRACT

Introduction

mHealth/eHealth have the effect to facilitate weight loss in overweight and obese populations. However, studies showed varied results and relatively high heterogeneity in the efficacy of mHealth/eHealth interventions. The aim of the paper is to systematically summarize published studies about the weight loss efficacy of mHealth/eHealth.

Methods and analysis

A comprehensive review of PubMed, Embase and Cochrane Library databases published from inception until March 21, 2021 will be conducted. The selected articles are meta-analyses that integrated the studies, which evaluated efficacy of mHealth/eHealth. Two people will select eligible articles and extract data independently. Any disputes will be resolved by discussion or the arbitration of a third person. The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE. Study selection process will be presented using a flowchart. We will re-analyze each outcome with the random effect methods. If possible, we will use funnel plot and Egger's test to evaluate if the publication bias existed.

Ethics and dissemination

Ethical approval is not required for the study, as we only collected data from available published materials. This umbrella review will also be submitted to a peer-reviewed journal for publication after completion.

PROSPERO registration number It has been submitted but has not yet been accepted

Strengths and limitations of this study

►When sufficient data are available, we will do subgroup analysis according to the forms of the intervention, such as mobile app group, text message group, website group.

►We will reanalyze each outcome using the random effects model.

►The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE.

Introduction

Description of the condition

Obesity is a chronic illness characterized by inordinate accumulation of body fat[1]. In 2005, 23.2% (937 million) of the global adult population was diagnosed as having overweight and 9.8% (396 million) as having obesity; the respective numbers of adults with overweight and obesity are projected to be 1.35 billion and 573 million individuals in 2030, without adjusting for secular trends[2]. Obesity is responsible for about 5 percent of all deaths a year worldwide, and its global economic impact amounts to roughly $2 trillion annually, or 2.8 percent of global GDP[3]. Research suggests that by delivering interventions via mHealth or eHealth, some of the cost problems of obesity interventions are mitigated[4-6] and these two modalities have the effect to facilitate weight loss in overweight and obese populations[6-7].

Description of the intervention

mHealth/eHealth refers to the health services delivered or enhanced through mobile/electronic-related technology[8-9]. There's a lot of overlap between them, mHealth help patients improve their adherence to health care providers' advice, enhance patient-provider communication, specifically mobile apps[10-11] and eHealth interventions combine the use of emerging communication technologies, such as the Internet and Smartphones, to facilitate behavior changes and improvements in health[12]. One previous reviews has described the development of mHealth and its utility for patients with obesity[13]. Nonetheless, their scope did not adequately address the effectiveness of eHealth for obesity treatment and without analyzing the findings from the original studies. An umbrella review evaluating the effectiveness of mHealth/eHealth interventions is required to weigh the strength and validity of mHealth/eHealth interventions in the literature.

Aim

This study aimed to conduct an umbrella review of meta-analyses regarding the associations between mHealth/eHealth interventions and Obesity treatment, and reanalyze its strength and validity.

Methods

Stage 1: identifying relevant studies

At this stage, authors will establish a team and discuss the eligibility criteria, electronic databases and search strategy.

Eligibility criteria

Meta-analyses of observational studies or meta-analyses of randomized controlled trials
Original studies and studies with no summary relative risks (e.g. systematic reviews), studies reported in languages other than English will be excluded.

Databases

The identification of studies relevant to this overview will be gained by searching the published reviews from inception of databases until March 21, 2021 which are listed below: PubMed, Embase and Cochrane Library. We will also manually search all reference lists of the included studies to identify additional reviews of relevance.

Search strategy

We will use the search strategy with these specified keywords: (Overweight OR Obesity OR weight gain OR weight loss OR body mass index OR skinfold thickness OR waist-hip ratio OR Abdominal Fat) AND (mhealth OR ehealth OR telemedicine) AND (Metaanalysis OR Meta OR meta-analys*). We will modify the search strategy to suit all three databases.

Stage 2: study selection

We will import our search results into software and then start selection. The review process consists of two levels of screening: (1) a title and abstract review and (2) a full-text review. In the first phase of screening, the titles and abstracts of the retrieved articles will be browsed through and analyzed by two independent investigators to identify potential eligibility. In the second phase, the two investigators will then independently evaluate the full-text articles to decide whether each should be included/excluded. Any discrepancies in the two phases will be reconsidered, and unresolved disagreements will be further discussed with a third investigator, until a full consensus is reached.

Stage 3: data extraction

Data extraction tables will be established in Excel and the data from selected articles will be extracted independently by two people. Disputes will be resolved by discussion or the arbitration of a third person if necessary.

The following categories of data will be extracted: the first author, year of publication, number of trials included, sample size, Intervention, Control, quality assessment, main conclusion.

Population

overweight and obese populations

Intervention

mHealth/eHealth

Comparators

Use other methods other than mHealth/eHealth or orthobiosis

Type of studies

meta analyses

Outcomes

Primary outcomes

Weight loss, BMI change, waist change

Secondary outcomes

None

Stage 4: data synthesis and statistical analysis

Statistical analysis will be conducted with RevMan V.5.4 software provided by Cochrane Collaboration and Stata V.12.0 software. In our analysis, when possible, we will stratify the comparisons into several groups, such as group of use other methods other than mHealth/eHealth and orthobiosis group. We will do subgroup analysis according to the forms of intervention, such as mobile app group, text message group, website group.

A qualitative and quantitative analysis will be provided. The quantitative analysis will be performed through calculation of weighted mean differences for continuous outcomes and risk ratio for the dichotomous.

Heterogeneity will be evaluated using the I² statistic. We will use 25%, 50% and 75% as cut-offs for low, moderate and high heterogeneity, respectively.

Stage 5: identifying possible publication bias

Small study effects and publication bias will be assessed by using graphical and statistical tests, namely the funnel plot and Egger's test. A p-value of <0.10 indicates the presence of publication bias.

Stage 6: evaluating quality of included studies

We will assess both the methodological quality and the quality of evidence of each including meta-analysis using validated tools. The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE.

Patient and public involvement

No patients are involved in developing plans for project and implementation of this study. None of them are asked to advise on interpretation of results. The results will be disseminated to the general population through public presentations by the authors.

Discussion

In the meta-analyses that focused on outcomes of mHealth/eHealth interventions, some of the results are widely divergent. When sufficient data are available, we will stratify our comparisons and do subgroup analysis.

The limitations of our study are the heterogeneity and quality of the selected reviews. To address the limitations, we will reanalyze each outcome using the random effects model. We will also use AMSTAR 2 and GRADE to evaluate quality of studies that we will include. Furthermore, these factors will be carefully considered when interpreting the results.

Ethics and dissemination

Ethical approval is not required for the study, as we only collected data from available materials. This umbrella review will also be submitted to a peer-reviewed journal for publication.

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Competing interests None declared.

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ORCID iD

Xiang-Guo Lei https://orcid.org/0000-0002-0094-7910

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[1]Geriatrics Department of Endocrinology and Metabolism, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China.

[2]Guangxi Clinical Research Center for Cardiocerebrovascular Diseases, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China

[3]Guangxi Key Laboratory of Precision Medicine in Cardio cerebrovascular Diseases Control and Prevention, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China

[4]Guangxi Medical University

Correspondence to

Xi Yang;

yangxicc2008@sina.cn

ABSTRACT

Introduction

mHealth/eHealth have the effect to facilitate weight loss in overweight and obese populations. However, studies showed varied results and relatively high heterogeneity in the efficacy of mHealth/eHealth interventions. The aim of the paper is to systematically summarize published studies about the weight loss efficacy of mHealth/eHealth.

Methods and analysis

A comprehensive review of PubMed, Embase and Cochrane Library databases published from inception until March 21, 2021 will be conducted. The selected articles are meta-analyses that integrated the studies, which evaluated efficacy of mHealth/eHealth. Two people will select eligible articles and extract data independently. Any disputes will be resolved by discussion or the arbitration of a third person. The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE. Study selection process will be presented using a flowchart. We will re-analyze each outcome with the random effect methods. If possible, we will use funnel plot and Egger's test to evaluate if the publication bias existed.

Ethics and dissemination

Ethical approval is not required for the study, as we only collected data from available published materials. This umbrella review will also be submitted to a peer-reviewed journal for publication after completion.

PROSPERO registration number CRD42021247006

Strengths and limitations of this study

►When sufficient data are available, we will do subgroup analysis according to the forms of the intervention, such as mobile app group, text message group, website group.

►We will reanalyze each outcome using the random effects model.

►The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE.

Introduction

Description of the condition

Obesity is a chronic illness characterized by inordinate accumulation of body fat[1]. In 2005, 23.2% (937 million) of the global adult population was diagnosed as having overweight and 9.8% (396 million) as having obesity; the respective numbers of adults with overweight and obesity are projected to be 1.35 billion and 573 million individuals in 2030, without adjusting for secular trends[2]. Obesity is responsible for about 5 percent of all deaths a year worldwide, and its global economic impact amounts to roughly \$2 trillion annually, or 2.8 percent of global GDP[3]. Research suggests that by delivering interventions via mHealth or eHealth, some of the cost problems of obesity interventions are mitigated[4–6] these two modalities have the potential to effectively facilitate weight loss in overweight and obese populations[6–7].

Description of the intervention

The WHO proposes eHealth as a facilitator of health, and mHealth is a component of eHealth. mHealth/eHealth generally refers to the health services delivered or enhanced through mobile/electronic-related technology[8–9]. There's a lot of overlap between them, mHealth help patients improve their adherence to health care providers' advice, enhance patient-provider communication, specifically mobile apps[10–11] and eHealth interventions combine the use of emerging communication technologies, such as the Internet and Smartphones, to facilitate behavior changes and improvements in health[12]. To date, mHealth/eHealth have no standard defifinition. In this study, we defified mHealth/eHealth as health practice or services supported by mobile phone, tablet and computer. One previous review of reviews has described the development of mHealth and its utility for patients with obesity[13]. Nonetheless, their scope did not adequately address the effectiveness of eHealth for obesity treatment and without analyzing the findings from the original studies. At present, there are many meta-analyses about mHealth/eHealth[14–17] and we are looking specifically at weight reduction between behavior change. Therefore this umbrella review evaluated the effectiveness of mHealth/eHealth interventions and weighed the strength and validity of mHealth/eHealth interventions in the literature.

Aim

This study aims to conduct an umbrella review of meta-analyses regarding the associations between mHealth/eHealth interventions and Obesity treatment, and reanalyze its strength and validity.

Methods

Stage 1: identifying relevant studies

At this stage, authors will establish a team and discuss the eligibility criteria, electronic databases and search strategy.

Eligibility criteria

Meta-analyses of observational studies or meta-analyses of randomized controlled trials and follow-up duration at least 4 weeks.

Original studies and studies with no summary relative risks (e.g. systematic reviews), studies reported in languages other than English will be excluded.

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Databases

The identification of studies relevant to this overview will be gained by searching the published reviews from inception of databases until March 21, 2021 which are listed below: PubMed, Embase and Cochrane Library. We will also manually search all reference lists of the included studies to identify additional reviews of relevance.

Search strategy

We will use the search strategy with these specified keywords: (Overweight OR Obesity OR weight gain OR weight loss OR body mass index OR skinfold thickness OR waist-hip ratio OR Abdominal Fat) AND (mhealth OR ehealth OR telemedicine) AND (Metaanalysis OR Meta OR meta-analys*). We will modify the search strategy to suit all three databases.

Stage 2: study selection

We will import our search results into software and then start selection. The review process consists of two levels of screening: (1) a title and abstract review and (2) a full-text review. In the first phase of screening, the titles and abstracts of the retrieved articles will be browsed through and analyzed by two independent investigators to identify potential eligibility. In the second phase, the two investigators will then independently evaluate the full-text articles to decide whether each should be included/excluded. Any discrepancies in the two phases will be reconsidered, and unresolved disagreements will be further discussed with a third investigator, until a full consensus is reached.

Stage 3: data extraction

Data extraction tables will be established in Excel and the data from selected articles will be extracted independently by two people. Disputes will be resolved by discussion or the arbitration of a third person if necessary.

The following categories of data will be extracted: the first author, year of publication, number of trials included, sample size, Intervention, Control, quality assessment, main conclusion.

Population

Adult population with overweight or obesity

We will define overweight as a body mass index (BMI) : 25 kg/m-squared and < 30 kg/m-squared (AAFP2013; WHO 2004). Obesity will be defined by a BMI : 30 kg/m-squared (AAFP 2013; WHO 2004)

Intervention

mHealth/eHealth as health practice or services supported by mobile phone, tablet or computer

Comparators

Use other methods other than mHealth/eHealth or orthobiosis

Type of studies

meta analyses

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Outcomes
Primary outcomes
Weight loss and Weight loss subgroup analysis (mobile phone base weight loss group, computer base weight loss group, tablet base weight loss group, mobile phone + computer base weight loss group, mobile phone + tablet base weight loss group, computer + tablet base weight loss group)

Secondary outcomes
BMI change, Waist change

Stage 4: data synthesis and statistical analysis
Statistical analysis will be conducted with RevMan V.5.4 software provided by Cochrane Collaboration and Stata software (version 12; StataCorp LP, College Station, Texas). In our analysis, when possible, we will stratify the comparisons into several groups, such as group of use other methods other than mHealth/eHealth and orthobiosis group. We will do subgroup analysis according to the forms of intervention, such as mobile app group, text message group, website group.
A qualitative and quantitative analysis will be provided. The quantitative analysis will be performed through calculation of weighted mean differences for continuous outcomes and risk ratio for the dichotomous.
Heterogeneity will be evaluated using the I^2 statistic. We will use 25%, 50% and 75% as cut-offs for low, moderate and high heterogeneity, respectively.

Stage 5: identifying possible publication bias
Small study effects and publication bias will be assessed by using graphical and statistical tests, namely the funnel plot and Egger's test. A p-value of <0.10 indicates the presence of publication bias.

Stage 6: evaluating quality of included studies
We will assess both the methodological quality and the quality of evidence of each including meta-analysis using validated tools. The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE.

Patient and public involvement
No patients are involved in developing plans for project and implementation of this study. None of them are asked to advise on interpretation of results. The results will be disseminated to the general population through public presentations by the authors.

Discussion
In the meta-analyses that focused on outcomes of mHealth/eHealth interventions, some of the results are widely divergent. When sufficient data are available, we will stratify our comparisons and do subgroup analysis.
The limitations of our study are the heterogeneity and quality of the selected reviews. To address

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the limitations, we will reanalyze each outcome using the random effects model. We will also use AMSTAR 2 and GRADE to evaluate quality of studies that we will include. These factors will be carefully considered when interpreting the results. Furthermore, we will discuss non-mHealth/eHealth interventions on Obesity treatment, including drug intervention and surgical intervention.

Ethics and dissemination
Ethical approval is not required for the study, as we only collected data from available materials. This umbrella review will also be submitted to a peer-reviewed journal for publication.

ORCID iD
Xiang-Guo Lei https://orcid.org/0000-0002-0094-7910

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ABSTRACT

Introduction

mHealth/eHealth have the effect of facilitate weight loss in overweight and obese populations. However, studies showed varied results and relatively high heterogeneity in the efficacy of mHealth/eHealth interventions. The aim of the paper is to systematically summarize published studies about the weight loss efficacy of mHealth/eHealth.

Methods and analysis

A comprehensive review of PubMed, Embase and Cochrane Library databases published from inception until March 21, 2021 will be conducted. The selected articles are meta-analyses that integrated the studies, which evaluated efficacy of mHealth/eHealth. Two people will select eligible articles and extract data independently. Any disputes will be resolved by discussion or the arbitration of a third person. The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE. Study selection process will be presented using a flowchart. We will re-analyze each outcome with random effect methods. If possible, we will use funnel plot and Egger's test to evaluate if the publication bias existed.

Ethics and dissemination

Ethical approval is not required for the study, as we only collected data from available published materials. This umbrella review will also be submitted to a peer-reviewed journal for publication after completion.

PROSPERO registration number CRD42021247006

Strengths and limitations of this study

►We defined mHealth/eHealth as health practice or services supported by mobile phone, tablet and computer without using a text messaging reminder for a close physical proximity face-to-face service.

►This study differs from previous studies as it aims to reanalyze each outcome.

►A comprehensive search strategy will be used with a large number of databases searched.

►When sufficient data is available, we will do weight loss and weight loss subgroup analysis.

►The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and

the quality of evidence with GRADE.

Introduction

Description of the condition

Obesity is a chronic illness characterized by inordinate accumulation of body fat[1]. In 2005, 23.2% (937 million) of the global adult population was diagnosed as having overweight and 9.8% (396 million) as having obesity; the respective numbers of adults with overweight and obesity are projected to be 1.35 billion and 573 million individuals in 2030, without adjusting for secular trends[2]. Obesity is responsible for about 5 percent of all deaths a year worldwide, and its global economic impact amounts to roughly $2 trillion annually, or 2.8 percent of global GDP[3]. Research suggests that by delivering interventions via mHealth or eHealth, some of the cost problems of obesity interventions are mitigated[4–6] these two modalities have the potential to effectively facilitate weight loss in overweight and obese population[6–7].

Description of the intervention

The WHO proposes eHealth as a facilitator of health, and mHealth is a component of eHealth. mHealth/eHealth generally refers to the health services delivered or enhanced through mobile/electronic-related technology[8–9]. There's a lot of overlap between them, mHealth help patients improve their adherence to health care providers advice, enhance patient-provider communication, specifically mobile apps[10–11] and eHealth interventions combine the use of emerging communication technologies, such as the Internet and Smartphones, to facilitate behavior changes and improvements in health[12]. To date, mHealth/eHealth have no standard definition. In this study, we defined mHealth/eHealth as health practice or services supported by mobile phone, tablet and computer without using a text messaging reminder for a close physical proximity face-to-face service. One previous review of reviews has described the development of mHealth and its utility for patients with obesity[13]. Nonetheless, their scope did not adequately address the effectiveness of eHealth for obesity treatment and without analyzing the findings from the original studies. At present, there are many meta-analyses about mHealth/eHealth[14–17] and we are looking specifically at weight reduction between behavior change. Therefore this umbrella review evaluated the effectiveness of mHealth/eHealth interventions and weighed the strength and validity of mHealth/eHealth interventions in the literature.

Aim

This study aims at conduct an umbrella review of meta-analyses regarding the associations between mHealth/eHealth interventions and obesity treatment, and reanalyze its strength and validity.

Methods

Stage 1: identifying relevant studies

At this stage, authors will establish a team and discuss the eligibility criteria, electronic databases and search strategy.

Eligibility criteria

Meta-analyses of observational studies or meta-analyses of randomized controlled trials and follow-up duration at least 4 weeks.

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Original studies and studies with no summary relative risks (e.g. systematic reviews), studies reported in languages other than English will be excluded.

Databases

The identification of studies relevant to this overview will be gained by searching the published reviews from inception of databases until March 21, 2021 which are listed below: PubMed, Embase and Cochrane Library. We will also manually search all reference lists of the included studies to identify additional reviews of relevance.

Search strategy

We will use the search strategy with these specified keywords: (Overweight OR Obesity OR weight gain OR weight loss OR body mass index OR skinfold thickness OR waist-hip ratio OR Abdominal Fat) AND (mhealth OR ehealth OR telemedicine OR digital health OR telehealth OR virtual medicine) AND (Metaanalysis OR Meta OR meta-analys* OR systematic review). We will modify the search strategy to suit PubMed, Embase and Cochrane Library databases.

Stage 2: study selection

We will import our search results into software and then start selection. The review process consists of two levels of screening: (1) a title and abstract review and (2) a full-text review. In the first phase of screening, the titles and abstracts of the retrieved articles will be browsed through and analyzed by two independent investigators to identify potential eligibility. In the second phase, the two investigators will then independently evaluate the full-text articles to decide whether each should be included/excluded. Any discrepancies in the two phases will be reconsidered, and unresolved disagreements will be further discussed with a third investigator, until a full consensus is reached.

Stage 3: data extraction

Data extraction tables will be established in Excel and the data from selected articles will be extracted independently by two people. Disputes will be resolved by discussion or the arbitration of a third person if necessary.

The following categories of data will be extracted: the first author, year of publication, number of trials included, sample size, Intervention, Control, quality assessment, main conclusion.

Population

Adult population with overweight or obesity

We will define overweight as a body mass index (BMI) : 25 kg/m-squared and < 30 kg/m-squared (AAFP2013; WHO 2004). Obesity will be defined by a BMI : 30 kg/m-squared (AAFP 2013; WHO 2004)

Intervention

mHealth/eHealth as health practice or services supported by mobile phone, tablet or computer

Comparators

Use other methods other than mHealth/eHealth or orthobiosis

Type of studies

Meta analyses

Outcomes

Primary outcomes

Weight loss and weight loss subgroup analysis (mobile phone base weight loss group, computer base weight loss group, tablet base weight loss group, mobile phone + computer base weight loss group, mobile phone + tablet base weight loss group, computer + tablet base weight loss group)

Secondary outcomes

BMI change, Waist change

Stage 4: data synthesis and statistical analysis

Statistical analysis will be conducted with RevMan V.5.4 software provided by Cochrane Collaboration and Stata software (version 12; StataCorp LP, College Station, Texas). In our analysis, when possible, we will stratify the comparisons into several groups, such as group of use other methods other than mHealth/eHealth and orthobiosis group. We will do subgroup analysis according to the forms of intervention, such as mobile app group, text message group, website group.

A qualitative and quantitative analysis will be provided. The quantitative analysis will be performed through calculation of weighted mean differences for continuous outcomes and risk ratio for the dichotomous.

Heterogeneity will be evaluated using the I^2 statistic. We will use 25%, 50% and 75% as cut-offs for low, moderate and high heterogeneity, respectively.

Stage 5: identifying possible publication bias

Small study effects and publication bias will be assessed by using graphical and statistical tests, namely the funnel plot and Egger's test. A p-value of <0.10 indicates the presence of publication bias.

Stage 6: evaluating quality of included studies

We will assess both the methodological quality and the quality of evidence of each including meta-analysis using validated tools. The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE.

Patient and public involvement

No patients are involved in developing plans for project and implementation of this study. None of them are asked to advise on interpretation of results. The results will be disseminated to the general population through public presentations by the authors.

Discussion

In meta-analyses that focused on outcomes of mHealth/eHealth interventions, some of the

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results are widely divergent. When sufficient data are available, we will stratify our comparisons and do subgroup analysis.

The limitations of our study are the heterogeneity and quality of the selected reviews. To address the limitations, we will reanalyze each outcome using the random effects model. We will also use AMSTAR 2 and GRADE to evaluate the quality of studies that we will include. These factors will be carefully considered when interpreting the results. Furthermore, we will discuss non-mHealth/eHealth interventions on Obesity treatment, including drug intervention and surgical intervention.

Ethics and dissemination

Ethical approval is not required for the study, as we only collected data from available materials. This umbrella review will also be submitted to a peer-reviewed journal for publication.

Contributors XY carried on the conception and construction of this protocol. X-GL developed the search strategy. X-GL and ZH found the tools for evaluating quality of included reviews. X-GL wrote the protocol. TR reviewed and amended draft of the protocol. X-GL and TR added grammar editing and conceptual clarification. All authors read and approved the final manuscript.

Competing interests None declared.

Patient consent for publication Not required.

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ORCID iD
Xiang-Guo Lei https://orcid.org/0000-0002-0094-7910

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BMJ Open

Effectiveness of mHealth/eHealth interventions on Obesity treatment: a protocol for umbrella review of meta-analyses

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Manuscripts

Effectiveness of mHealth/eHealth interventions on obesity treatment: a protocol for umbrella review of meta-analyses

Xiang-Guo Lei[123], Zhongheng Huang[4], Rashi Tamrakar[123], Xi Yang[123]

[1]Geriatrics Department of Endocrinology and Metabolism, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China.

[2]Guangxi Clinical Research Center for Cardiocerebrovascular Diseases, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China

[3]Guangxi Key Laboratory of Precision Medicine in Cardio cerebrovascular Diseases Control and Prevention, The First Affiliated Hospital of Guangxi Medical University, Nanning, Guangxi, China

[4]Guangxi Medical University

Correspondence to

Xi Yang;

yangxicc2008@sina.cn

ABSTRACT

Introduction

mHealth/eHealth have the effect of facilitating weight loss in overweight and obese populations. However, studies have shown varied results and relatively high heterogeneity in the efficacy of mHealth/eHealth interventions. The aim of the paper is to systematically summarize published studies about the weight loss efficacy of mHealth/eHealth.

Methods and analysis

A comprehensive review of PubMed, Embase and Cochrane Library databases published from inception until March 21, 2021 will be conducted. The selected articles are meta-analyses that integrated the studies, which evaluated efficacy of mHealth/eHealth. Two people will select eligible articles and extract data independently. Any disputes will be resolved by discussion or the arbitration of a third person. The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE. Study selection process will be presented using a flowchart. We will re-analyze each outcome with random effect methods. If possible, we will use funnel plot and Egger's test to evaluate if the publication bias existed.

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PROSPERO registration number CRD42021247006

Strengths and limitations of this study

►This study differs from previous studies as it aims to reanalyze each outcome.

►A comprehensive search strategy will be used with a large number of databases searched.

►The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE.

►Mobile health/e-health interventions for obesity treatment include multiple modalities, so we may not include all interventions in an umbrella review.

►Studies related to rare intervention methods might not be included in systematic reviews, and

thus would not be represented in this umbrella review, a main limitation of our work.

Introduction

Description of the condition

Obesity is a chronic illness characterized by inordinate accumulation of body fat[1]. In 2005, 23.2% (937 million) of the global adult population was diagnosed as having overweight and 9.8% (396 million) as having obesity; the respective numbers of adults with overweight and obesity are projected to be 1.35 billion and 573 million individuals in 2030, without adjusting for secular trends[2]. Obesity is responsible for about 5 percent of all deaths a year worldwide, and its global economic impact amounts to roughly $2 trillion annually, or 2.8 percent of global GDP[3]. Research suggests that by delivering interventions via mHealth or eHealth, some of the cost problems of obesity interventions are mitigated[4–6]. These two modalities have the potential to effectively facilitate weight loss in overweight and obese population[6–7].

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Aim

This study aims to conduct an umbrella review of meta-analyses regarding the associations between mHealth/eHealth interventions and obesity treatment, and reanalyze its strength and validity.

Methods

Stage 1: Identifying relevant studies

At this stage, authors will establish a team and discuss the eligibility criteria, electronic databases and search strategy.

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Meta-analyses of observational studies or meta-analyses of randomized controlled trials and follow-up duration of at least 4 weeks.

Original studies and studies with no summary of relative risks (e.g. systematic reviews), studies

reported in languages other than English will be excluded.

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We will define overweight as a body mass index (BMI) : 25 kg/m^2 and < 30 kg/m^2 (AAFP2013; WHO 2004). Obesity will be defined by a BMI : 30 kg/m^2 (AAFP 2013; WHO 2004)

Intervention

mHealth/eHealth as health practices or services supported by mobile phones, tablets or computers

Comparators

Use other methods other than mHealth/eHealth or orthobiosis

Type of studies
Meta analyses

Outcomes
Primary outcomes
Weight loss and weight loss subgroup analysis (mobile phone base weight loss group, computer base weight loss group, tablet base weight loss group, mobile phone + computer base weight loss group, mobile phone + tablet base weight loss group, computer + tablet base weight loss group)

Secondary outcomes
BMI change, Waist change

Stage 4: Data synthesis and statistical analysis
Statistical analysis will be conducted with RevMan V.5.4 software provided by Cochrane Collaboration and Stata software (version 12; StataCorp LP, College Station, Texas). In our analysis, when possible, we will stratify the comparisons into several groups, such as group that uses other methods other than mHealth/eHealth and orthobiosis group. We will do subgroup analysis according to the forms of intervention, such as mobile app group, text message group, website group.

A qualitative and quantitative analysis will be provided. The quantitative analysis will be performed through calculation of weighted mean differences for continuous outcomes and risk ratio for the dichotomous.

Heterogeneity will be evaluated using the I^2 statistic. We will use 25%, 50% and 75% as cut-offs for low, moderate and high heterogeneity, respectively.

Stage 5: Identifying possible publication bias
Small study effects and publication bias will be assessed by using graphical and statistical tests, namely the funnel plot and Egger's test. A p-value of <0.10 indicates the presence of publication bias.

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We will assess both the methodological quality and the quality of evidence for each, including meta-analysis using validated tools. The methodological quality of the included meta-analyses will be assessed with AMSTAR 2 and the quality of evidence with GRADE.

Patient and public involvement
No patients are involved in developing plans for project and implementation of this study. None of them are asked to advise on interpretation of results. The results will be disseminated to the general population through public presentations by the authors.

Discussion
In meta-analyses that focused on outcomes of mHealth/eHealth interventions, some of the results are widely divergent. When sufficient data are available, we will stratify our comparisons

and do subgroup analysis.

The limitations of our study are the heterogeneity and quality of the selected reviews. To address the limitations, we will reanalyze each outcome using the random effects model. We will also use AMSTAR 2 and GRADE to evaluate the quality of studies that we will include. These factors will be carefully considered while interpreting the results. Furthermore, we will discuss non-mHealth/eHealth interventions on Obesity treatment, including drug intervention and surgical intervention.

Ethics and dissemination

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ORCID iD

Xiang-Guo Lei https://orcid.org/0000-0002-0094-7910

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